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HANDBOOK

OF THE

4.7-INCH Q.F. GUN.



LAND SERVICE.

1898.



LONDON:

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BY HARRISON AND SONS, ST. MARTIN'S LANE,
PRINTERS IN ORDINARY TO HER MAJESTY.

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CONTENTS.

	PAGE.
Description of the Guns	3
Breech-closing Mechanism	5
Firing Mechanism	5
Sights	7
Care and Preservation of Gun and Fittings	8
Description of Carriages	11
Care and Preservation of Carriage	14
Ammunition	16
Range Table	24
Drill	28

PLATES.

Guns	I to III
Breech-closing Mechanism	IV to VI
Mountings { Mark I	VII to IX
{ Mark II	X
Carriage	XI
Projectiles	XII, XIII
Cartridges	XIV, XV
Primer, Electric	XVI
Keys	XVII
Fuze	XVIII
Tube, V. S. Percussion	XIX

NOTE.—This Handbook is corrected up to July, 1898. Any alterations which may be suggested should be forwarded to the Chief Inspector, Royal Arsenal, Woolwich,



4.7-INCH Q.F. GUN,

MARKS II, III, AND IV.

GUN.

(Plate I.)

PUBLIC LIBRARY OF VICTORIA	Material	{ Marks II and III steel. Mark IV steel (wire construction).
	Weight	{ of gun without fittings { Marks II and III .. 40 cwt. 1 qr. 11 lb. Mark IV 41 cwt. 3 qr. of breech fittings { Marks II and III .. 1 cwt. 17 lb. 4.7 inch B 1 cwt.
	Length, total	194.1 inches.
	Bore .. { calibre	4.724 inches.
	.. { length (to face of breech screw)	189 inches = 40 calibres.
	.. { system	polygroove, E.O.C. section.
	.. { length	171 inches.
	Rifling Mark I { twist	increasing from 1 in 100 calibres at breech end of rifling to 1 in 34.352 calibres at 6.65 inches from the muzzle, the 6.65 inches being uniform 1 in 34.352 calibres.
	.. { grooves	{ number .. 22. width .. 0.5 of an inch. depth .. 0.01 of an inch.
	* Rifling Mark II { system	polygroove, modified plain section.
	.. { length	171 inches.
	.. { twist	straight from breech end of rifling to 142.656 inches from the muzzle, the remaining 142.656 inches increasing from 0 to 1 turn in 30 calibres at muzzle.
	.. { grooves	{ number .. 22. width .. .45 of an inch. depth .. .01 of an inch.
	Firing mechanism	electric or percussion.

MARK II GUN.

(Plate I.)

THE gun is of steel, and consists of an A tube, over which are shrunk a jacket, prolonged at the rear for the reception of the screw, a B hoop and 1 B and 2 B tubes, extending to the muzzle. The 1 B tube

* Guns of future manufacture, and existing guns when re-tubed or through-lined, will be rifled with Mark II rifling.

is secured longitudinally by being screwed to the B hoop, the 2 B tube being secured in a similar manner to the 1 B tube. A C hoop is shrunk over portions of the jacket and B hoop, securing them longitudinally by being screwed to the jacket. A breech ring is shrunk over the jacket at the rear for attaching the gun to the hydraulic buffer of the mounting. The ring is also prepared for the reception of an eye-bolt. The exterior of the jacket is furnished with longitudinal projections which form guides for the gun when in the cradle.

The chamber is slightly coned throughout its length.

MARK III GUN.

(Plate II.)

The gun is of steel, and consists of an A tube, over which are shrunk a jacket, prolonged at the rear for the reception of the screw, a B hoop and 1 B and 2 B tubes extending to the muzzle. The jacket is secured longitudinally by means of locking shoulders and a screwed steel ring. The B hoop is shrunk round the A tube immediately in front of the jacket. The 1 B tube is secured to the A tube and B hoop by serrations formed on the inner rear end of the 1 B tube, and corresponding serrations on the A tube and front portion of the B hoop, the latter overlapping the 1 B tube at the joint; the 2 B tube being secured in a similar manner to the A tube and 1 B tube. A C hoop is shrunk over portions of the jacket and B hoop securing them longitudinally by being screwed to the jacket, and hooked over a locking shoulder formed on the B hoop.

The breech ring for attaching the gun to the hydraulic buffer of the mounting is shrunk over the jacket at the rear, and is prepared for the reception of an eye-bolt.

The exterior of the jacket is furnished with longitudinal projections similar to those of the Mark II guns.

The chamber and rifling are similar to those of the Mark II gun.

MARK IV GUN.

(Plate III.)

The gun is constructed of steel, and consists of an A tube, around a portion of which are wound successive layers of flat steel wire, the ends of which are secured to steel rings provided for that purpose. The jacket is fitted over the exterior of the wire and a portion of the A tube, and secured longitudinally by means of a steel breech bush at the rear. The breech bush is screwed to the jacket and A tube, and is prepared for the reception of the breech screw. The B tube is shrunk over the A tube immediately in front of the jacket, extending to the muzzle, and is secured to the jacket by a screwed C hoop.

The breech ring for attaching the gun to the hydraulic buffer of

the mounting is screwed over the jacket at the rear, and is prepared for the reception of an eye bolt.

The exterior of the jacket has longitudinal projections formed on it similar to those of Marks II and III guns.

The chamber and rifling are similar to those of Marks II and III guns.

Breech-closing Mechanism (Marks II and III Guns).

(Plates IV and V.)

The breech is closed by a steel screw tapering at the front portion to admit of its being swung into the loading position, the remainder being parallel.

The thread of the parallel part has three interruptions, similar to those of the breech screws belonging to the smaller calibres of B.L. guns. The thread of the taper portion is also interrupted in a similar manner, but the divisions in relief are placed opposite the plain portions of the parallel part, for the purpose of distributing the strain. The breech opening of the gun being prepared in a corresponding manner admits of the screw being locked by the sixth of a turn.

A bronze plate is attached to the rear face of the breech screw, carrying a cam lever (by which the screw is worked), and portions of the breech mechanism.

To secure the breech screw in its locked position, the cam portion of the lever falls into a recess in the gun when the breech is closed, and thus prevents any movement during firing.

Projections on the end plate coming in contact with the carrier, form stops to prevent the screw overriding.

A carrier supporting the screw is hinged to the breech ring by a bolt, the screw being attached to the carrier by a stop screw.

A spring clip fitted to the carrier serves to retain the screw in position when the breech is open. The clip is automatically disengaged from the screw in closing the breech.

A spring catch serves to retain the cam lever in the "up" or "down" position.

Firing Mechanism (Marks II and III Guns). Electric or Percussion.

The firing mechanism is so arranged that the gun cannot be fired until the breech screw is locked in the gun, and the cam lever partially lowered.

Electric.

Fitted to the carrier, and projecting through the centre of the breech screw, is a striker actuated by a main spring, and provided with an insulated steel needle, which makes contact with the primer of the cartridge. Attached to the other end of the needle is a flexible covered wire, for connecting it with an insulated contact fitted to the lower portion of the end plate.

Attached to the rear end of the cradle is a bracket, fitted with a pivoted electric lever, having at one end an insulated contact so

arranged that when the screw is locked and the trigger lever pulled, it makes contact with the electric contact of the breech screw.

The contact of the electric lever is connected to the battery by means of a cable, and is protected by a cap, which is automatically raised when the lever is pulled.

Percussion.

To admit of the gun being fired by percussion a nickel-plated cross handle steel striker is substituted for the insulated needle used with the electric firing mechanism. In raising the cam lever to open the breech, the striker is cocked automatically by a pivoted cocking lever, and is retained in the firing position by a trigger-sear fitted to the end plate of the breech screw.

A trigger bracket, which is attached to the left rear face of the breech, is furnished with a trigger, which engages with the trigger-sear when the screw is locked in the gun. A guide is formed on the lower portion of the bracket, to ensure the trigger-sear engaging with the striker. A lanyard is attached to the trigger, by which the gun is fired when the cam lever is depressed.

To put the percussion mechanism out of gear, the trigger-sear is depressed and reversed.

The electric striker, fitted with insulated needle, may be used for percussion firing, if necessary.

Extractor.

The extractor consists of a steel bolt, projecting through the side of the gun at the breech, having a shoulder cut on the inner end to accommodate the head of the cartridge case. Fitted to the outer end of the extractor is a buffer bracket, actuated automatically by an eccentric formed on the upper portion of the carrier hinge, when the screw is swung into the loading position, thus partially revolving the extractor bolt, and releasing the cartridge case. A spiral spring in the buffer bracket serves to force the extractor into its original position while the breech is being closed.

Single Motion Breech Mechanism.

(Plate VI.)

The Mark IV and certain of the Marks II and III guns have been fitted with a "Single Motion Breech Mechanism," which is so arranged that by one pull on a lever the breech screw is automatically unlocked, withdrawn, and swung clear for loading. After loading, one thrust on the same lever inserts the breech screw and turns it home; at the same time the striker is retained in a position of safety until the breech screw is securely locked and the actuating lever home. This motion is effected by means of a sliding block on the lower part of the carrier, attached by a short link to the lever, which is hinged to the carrier. When this lever is pulled the link moves the sliding block, and this, acting on a stud fixed to the breech screw, turns the latter, which is then withdrawn by the sustained pull on the lever. A recess in the outer face of the breech screw engages with a spring catch in the carrier and retains the breech screw in the

unlocked position; this catch is automatically disengaged from the screw in closing the breech.

For percussion firing, the striker is pulled out to the cocked position, and retained there by a trigger engaging in a cock-notch on the striker, which is fitted with a cross handle for the purpose of cocking. The trigger is reversible, so that the gun may be fired from either side, and on its outer end is a loop for the attachment of the lanyard.

For electric firing, the cable is attached to the insulated steel needle, from whence it is led through a supporting eye on the carrier to the contact on the gun.

When fitted with this mechanism the guns are known as 4.7-inch B.

SIGHTS.

The sights for guns on Marks I and I* carriages are fitted to brackets attached to the cradle on the left side of the gun.

The foresight is of the drop pattern, and consists of a pillar, jacket, and socket, surmounted by a circular frame with cross wires for fine sighting, and a steel acorn point on the top for rough laying. The socket is permanently fixed in a bracket attached to the cradle. The pillar locks into the socket with a bayonet joint, and is secured from turning by a projection on the jacket which drops into a recess in the socket when the sight is in its true position. The sight cannot be removed without first raising the jacket and turning the pillar round a quarter of a circle.

The Mark I tangent sight for use with powder charges consists of a steel bar triangular in section, having teeth cut on the right-hand corner, forming a rack which gears with the pinion of the automatic clamp. The rear faces are fitted with aluminium crown metal range strips, one of which is graduated in degrees up to 15 degrees reading to 10 minutes, and the other in yards to 7,600 yards for a M.V. of 1,786 f.s. The cross head is fitted with a deflection leaf worked by a screw capable of giving 2 degrees deflection right and left. The leaf has a notch .06 of an inch deep for rough laying, and a small hole for fine laying. On the leaf is engraved a zero mark, and the deflection scale is engraved on an aluminium crown metal scale plate attached to the corresponding upper face of the cross head.

The Mark II tangent sight for use with cordite charges differs from the Mark I described above in having a narrower deflection nut, and in being furnished with a yard scale range strip and deflection scale plate graduated for cordite charges. The range strip is graduated to 8,500 yards for a M.V. of 2,150 f.s., and is stamped "cordite." The scale plate differs from that of the Mark I sight in having the zero point .107 inch to the left to allow for the difference of drift, and is stamped "cordite."

The sighting arrangement for guns on Mark II carriage consists of a steel rocking-bar, pivoted in the centre to one end of a steel carrier attached to the mounting.

The rear end of the rocking-bar is furnished with a hind sight, having a cross head giving 2 degrees deflection; the cross head is furnished with a deflection leaf having a notch for rough laying,

and a small hole for fine laying. The lower portion of the sight consists of a sight arc, fitted on the rear face with an aluminium range strip graduated to 20 degrees. The muzzle face of the sight arc is furnished with a rack which engages with a pinion actuated by a hand wheel fitted to the carrier. Attached to the pinion spindle is a cylinder, furnished round the periphery with an aluminium range strip, graduated to 9,600 yards for a full charge, with a muzzle velocity of 2,150 f.s. To facilitate reading the yard scale a reader is attached to the rear end of the carrier.

The foresight is of steel, with a circular aperture containing diagonal cross wires for use in conjunction with the small hole in the deflection leaf of the hind sight for fine laying, and surmounted by a steel acorn point for rough laying. The sight fits into a recess in the front end of the rocking-bar, and is secured by a fixing screw. A recess is formed in the front end of the rocking-bar for the reception of a night sight.

The carrier, which supports the rocking-bar of the sight, is fitted to the mounting by means of two screwed bushes (one of which is eccentric and is used for adjusting the sight) and two securing screws.

CARE AND PRESERVATION OF GUN AND FITTINGS.

The gun should be examined after firing every 100 rounds with projectiles.

For the purposes of computation four rounds of blank charges should be considered equal to one round with projectile, but in recording the rounds on the memorandum of examination blank rounds should be shown as such. Only one-fourth of the total number of blank rounds fired will be carried forward to the column headed, "Total number of rounds for examination purposes."

The bores of guns, from which practice is carried on, should be kept slightly oiled to prevent rusting. At the close of each day's practice, they should accordingly be washed and slightly depressed, and when dry, oiled, the muzzles being then closed with tampons.

When guns are not likely to be used for some length of time, the sights, guard lever electric firing with lever, breech screw, carrier, and smaller fittings should be removed, and kept in store, the small holes in the guns being filled with plugs of greased tow, and the breech opening with a wood plug, to keep out water and dirt. These plugs can be readily removed when it is required to fit the sights, &c., to the guns.

The sights and other fittings should be kept clean, free from grit, and oiled.

The exposed portions of the sights are bronzed if made of gun-metal, and blued if of steel. This is done to preserve them from corrosion, and on no account are these parts to be burnished or cleaned in such a manner as to remove the bronzing or blueing.

The bore and all working parts must at all times be kept slightly oiled, and perfectly free from rust.

During firing, the breech screw and breech opening must be kept perfectly clean, free from dirt, and well greased with a mixture of oil and tallow.

The officer in charge of the gun must always see that the safety mechanism is in good working order, and that the cam lever is in its proper position before firing.

Removal of Three-Motion Breech Fittings.

In removing the breech fittings of the gun the following instructions will be observed:—

Carrier and breech screw.—Elevate the cam lever and unlock the breech by giving the lever a smart pull to the left as far as it will go, then swing open the breech. Withdraw the keep pin and washer of the carrier hinge bolt, and remove the hinge bolt; the breech screw, with carrier and washer can then be removed from the gun.

Striker.—Remove the keep-pin of the contact breech screw, and withdraw the contact from the end plate; the striker, together with the contact, can then be unscrewed by hand, and withdrawn from the breech screw.

Cam lever.—Remove the keep pin of the cam lever hinge bolt and withdraw the hinge bolt; the cam lever can then be removed.

Link.—Depress the spring of the axis pin for link, and withdraw the axis pin; remove the link, unscrew the screws in the brackets supporting the link, and remove the brackets.

Striker holder.—Withdraw the trigger-sear, and give it one-third of a turn to the right; unscrew the set screw of the striker retaining nut half a turn, so as to clear the striker retaining nut, the latter can then be unscrewed by means of the "wrench A," and the striker holder, together with the nut and main spring, removed from the breech screw.

Trigger-sear.—Place the trigger-sear in the electric firing position and remove the fixing screw. Withdraw the trigger-sear until the square shoulders are clear of the bracket, then unscrew to the left, and remove the two portions with spiral spring.

Unscrew the fixing screw of the breech screw and remove the carrier, unscrew the fixing screws of the end plate, and remove the end plate.

Unscrew the fixing screws of the trigger bracket, and remove the bracket with the trigger and lanyard.

Extractor.

Remove the cover and withdraw the spiral spring and buffer; take out the keep pin of the actuating plate axis pin, and remove the axis pin and actuating plate; remove the fixing screw of the lever, and withdraw the lever; remove the fixing screws of the filling piece, and withdraw the extractor bolt and filling piece from the interior of the gun.

Removal of Single Motion Breech Fittings.

Striker.—Withdraw the striker from the recess in the retaining nut and turn the nut one fourth of a turn to the right or left according to the position of the trigger, the striker with retaining nut can then be withdrawn to the rear.

Carrier and breech screw.—Unlock the breech and swing the breech screw and carrier into the loading position by giving the lever breech mechanism a sharp pull from left to right. Withdraw the keep pin and remove the washer of the carrier hinge bolt and remove the hinge bolt, the breech screw with carrier can then be taken from the gun.

Lever, breech mechanism.—Withdraw the keep pins and remove the nuts from the axis pin of the lever breech mechanism and the link actuating breech screw; the lever breech mechanism can then be removed.

Link, actuating.—Take out the screw retaining axis pin and axis pin of the link actuating and remove the link.

Bracket, catch retaining breech screw.—Take out the fixing screws of the bracket, catch retaining, breech screw, and slide out the bracket, taking care to press in the catch. Unscrew the guide screw, and the retaining catch with spiral spring can then be removed.

Breech screw and sliding block.—Take out the fixing screw of the breech screw, and remove breech screw from carrier. The sliding block with bush can then be withdrawn from carrier.

Safety stop.—Take out the fixing screw of the safety stop, after first removing the cheek screw, and withdraw the two parts of the safety stop, one in an upward and the other in a downward direction.

Eye supporting cable.—The eye supporting cable can be withdrawn by a straight pull.

Trigger.—To remove the trigger, press the projecting end of the spiral spring from the recess in the retaining cap, the cap can then be unscrewed and the trigger withdrawn from the striker.

Bracket supporting contact.—Unscrew the bracket by means of the wrench "C," and remove it from the gun.

To replace fittings.—The fittings are replaced in the reverse order.

Examination of Q.F. Fittings.

All removable fittings should occasionally be taken entirely apart and examined in order to ascertain that they are quite sound and in good working order, any in which a crack is observed should be exchanged. The electric and percussion striker should be tested to see that the insulation is not defective. All springs should be examined to see that they are serviceable. The inner end of the extractor bolt should be examined to see that it is in good condition, but the bolt should not be taken out of the gun oftener than is necessary, owing to the filling piece with fixing screws having to be removed from the interior of the chamber. When it is found necessary to remove the extractor bolt from the gun great care must be exercised in replacing the filling piece and fixing screws so as to leave no burrs in the chamber. In the event of the hole in the firing bush in the inner end of the breech-screw becoming enlarged by erosion the bush should be removed and replaced by the spare one.

Memorandum of Examination.

Every gun issued from the Royal Arsenal is accompanied by a "Memorandum of Examination," which is known by that name, and does not bear an Army Form number.

It contains a short description of the construction and rifling, with a drawing of the gun, showing principal dimensions, also on the first page are given the particulars of any slight original defect or tool mark which may have existed at the date of issue.

On the inside sheet are recorded in detail the nature and number of rounds fired, with the dates and results of the periodical examination.

tions of the gun. This memorandum will remain in charge of the Officer who has possession of the gun, and a certificate to the effect that it is in possession and complete up to date, will be included in the Annual Return of Rifled Ordnance, Army Form G, 925.

At the conclusion of each day's practice with the gun an entry will be made in the memorandum by the Officer in charge, giving a detail of the rounds fired (including blank charges), so that an accurate record of the firing may always be kept up. The result of the examination of the gun will be added to the memorandum by the Inspecting Officer, or Examiner, who performs the duty, and when the gun is returned into, or issued from store, the memorandum will accompany the transfer vouchers. If at any time the memorandum be lost or damaged a duplicate can be obtained from the Chief Inspector, Woolwich, by whom also inside sheets for continuation of the record of the number of rounds fired will be supplied on demand.

CARRIAGE, GARRISON, Q.F., 4.7-INCH CENTRAL PIVOT, MARKS I, II, AND III.

Mark I.

(*Plates VII, VIII, and IX.*)

The carriage is constructed to allow 20 degrees elevation, and 10 degrees depression; it revolves about a centre pivot on a live roller ring, which runs on a roller path bolted to a pedestal by which the carriage is secured to the emplacement. The gun recoils axially about 8 inches in a cradle, which is fitted with a hydraulic buffer to limit the recoil, and a powerful spring to return the gun to the firing position and retain it there. Fittings are provided by which the gun can be fired electrically.

The carriage consists of the cradle, *a*; under carriage, *b*; base plate, *c*; pivot plate, *d*; live roller ring, *e*; pedestal, *f*; inner shield, *g*; and outer shield, *h*.

The cradle, *a*, is in one casting of gun metal, with trunnions to pivot it to the under carriage, *b*; the gun recoils in the upper part of the cradle, the lower part is bored to take at the rear the steel cylinder, *i*, for the hydraulic buffer, and at the front the running-out spring, *j*. A tank is formed at the right side to hold four pints of oil, which can flow through a small hole in constant communication with the buffer, to keep the latter always full. The piston is connected to the gun by the breech ring, *l*; it has a port for the flow of the oil, and a metal ring let into the periphery to prevent seizure. In the cylinder is fixed a tapering bar which varies the opening of the port in the piston, so as to give an approximately uniform pressure during recoil. A controlling ram is fixed to the front end of the buffer so as to enter a hole in the piston rod, and by displacing the oil therein contained, gradually bring the gun to rest when returning to the firing position. The running-out spring has a plate in front of it, connected by rods to the breech ring, *l*; the spring is compressed during recoil; on its expansion, the gun returns to the firing position.

A brass guard is fixed to the rear of the cradle.

The under carriage *b* consists of two cast-steel brackets bolted at the front to the inner shield *g*, and riveted at the bottom to the base plate *c*, on the under side of which is fixed an upper roller path. One rear and two front clips bolted to the base-plate hook under a rim on the pivot plate, and prevent the carriage lifting when the gun is fired. The base plate has a rim on its outer edge to protect the rollers and pivot plate.

The shoulder-piece *n*, and the elevating and traversing gears are fixed to the left bracket of the under carriage. The shoulder-piece consists of a wood stock with a pliable pad of india-rubber fixed to it.

The elevating gear is actuated by the hand-wheel *o*, which transmits motion, through worm-wheel gearing, to an elevating arc *p*, attached to the cradle. A frictional arrangement is fitted in the hollow boss of the worm-wheel, consisting of alternate discs of steel and manganese bronze, respectively arranged to revolve with the spindle and worm-wheel. The discs are pressed together by a nut acting on a spring steel washer, the nut being so adjusted as to produce sufficient friction to prevent the gun running down when at extreme recoil. An adjustable metal reader is bolted to the left bracket of the lower carriage in such a position that its reading edge coincides with the zero of the graduations on the elevating arc, when the axis of the gun is horizontal. The gun may be traversed rapidly from the shoulder-piece *n*, or slowly by the traversing gear. The traversing gear consists of a worm which, engaging with the worm-wheel *q*, is worked by the hand-wheel *r*; when traversing is effected from the shoulder-piece, the worm-wheel revolves round the pivot-pin, but when the traversing gear is used, the worm-wheel is prevented from revolving round the pivot-pin, by a clamping arrangement; the carriage is thus traversed by the action of the worm. The clamping arrangement consists of a series of steel and manganese bronze rings, keyed respectively to the pivot-pin and worm-wheel; these rings are jammed together by the wheel *s*, which has a thread cut in its boss to work on a screw at the top of the pivot-pin. The wheel *s* is turned by a bevel pinion fitted with a handle *t*; when the handle is not in use it is removed and housed in a loop on the right bracket.

The pivot plate *d* is a steel casting with a lower roller path for the live rollers, which run on axles projecting from the roller-ring *e*. The pivot plate *d* is bolted to the pedestal *f*, which is a circular steel casting, firmly bedded and bolted in concrete.

The inner shield *g* is a steel plate 3 inches thick; at the front is a sliding steel plate fitted with counterweights *m*, so that it automatically follows the gun, and completely closes the lower part of the port when the gun is elevated.

The outer shield *h* is of $1\frac{1}{4}$ -inch steel, circular in form, and bolted to the inner shield *g*; the roof *u* is hinged so that it may be opened by the lever *v*.

An electric battery is contained in a box, *w*, the current being conveyed by a wire to a terminal fitted at the rear end of the pistol grip for establishing electrical communication with the electrical firing gear on the breech of the gun; this terminal is insulated, and provided with an automatic guard fitted with an ivory lining which covers the terminal directly the trigger is released. On pulling the trigger this guard is removed, and electrical communication is made between the terminals and an electrical primer in the base of the cartridge.

Weights.

Cradle	13½ cwt.
Lower carriage	27 "
Shield	21½ "
Pivot plate	5 "

Mark I*.

This is the Mark I carriage fitted with a pistol grip and electric cables, similar to the Mark II carriage, to suit the Q.F. 4.7-inch guns with single motion mechanism.

Mark II.

(Plate X.)

This carriage differs from the Mark I in having the cradle mounted in a fork-shaped pivot, which revolves on a ring of steel balls contained in the pedestal.

The pivot is a steel forging with trunnion bearings to support the cradle. To the left side is bolted a long bracket, to which the bearings for the elevating and traversing gears are fixed; these gears are similar to those already described, but the worm wheel of the traversing gear is fitted on the top of the pedestal so that its boss forms a bearing for the upper part of the stem of the pivot, the lower part of which fits in a bearing at the bottom of the pedestal. The pivot is supported by ball bearings, the balls running in a circular channel cut in a metal flange, which is bolted to the bottom of the pivot socket. A hard bronze ring is let into the base of the pivot and a steel ring in the bed of the channel to reduce the wear by friction.

The worm wheel is free to move on the pedestal, so that the whole system can be traversed from the shoulder-piece independent of the gear; when, however, it is required to use the latter, the worm wheel can be rigidly fixed by means of a small clamping arrangement, consisting of a block and screw which is actuated by a lever.

The pedestal is bolted to a steel foundation plate, which is let into concrete and secured by holding-down bolts and plates.

The shield consists of a curved 4½-inch steel plate, fitted at the sides with 2-inch vertical wings; the 4½-inch shield slopes to the rear, and in it is cut the gun port. The roof is of 1-inch steel except the sloping portion at the rear end, which is 1¼ inch; in the roof is cut an aperture for the sight bar, the sighting being effected over the roof through a port cut in the rear sloping part.

The weight of the shield is borne by stays, one on either side, bolted to the brackets of the carriage.

The battery box is suspended by bands below the elevating gear.

Mark III.

(Plate XI.)

This carriage is similar to the Mark II, but the cradle is supported by an under carriage and the gun may be traversed either rapidly from the shoulder-piece, or slowly by means of a pinion gearing into a circular rack fixed to the floor of the work.

The carriage consists of two steel cheeks bolted to a steel transom, the underside of which is formed into a cap to fit over a pivot plug and revolve on ball bearings. The balls run in grooves between hardened rings to minimise wear; one ring is fitted into the top of the pivot plug, the other into a groove formed in the cap of the transom. The upper part of the cheeks is fitted with trunnion bearings to support the cradle, and on the left cheek is bolted a steel plate to carry the elevating and traversing gears.

When traversing with the gear motion is transmitted from the hand wheel by means of a short shaft to a worm, which gears into a worm wheel keyed on the upper end of a vertical shaft; at the lower end of the vertical shaft is fixed the pinion which works in the circular rack.

When it is required to traverse the gun from the shoulder-piece, the worm wheel is thrown out of gear by releasing a clamping arrangement. This arrangement is contained in the hollow of the worm wheel, and consists of a series of steel and metal discs, which are clamped together or released by turning a small hand wheel.

The shield is a curved steel plate supported by curved stays bolted to the carriage.

The pedestal is a large steel casting, formed to take the pivot plug, and bolted to a base plate let into the concrete of the emplacement.

Care and Preservation.

If the carriage is not frequently used the movable parts of the elevating and other gears will be removed and placed in store, where the bright parts of the ironwork will be coated with anti-corrosive grease, to preserve them from rust.

These parts will be thoroughly cleaned and placed in position at least once in three months to see that they are in proper working order. All other gears should be worked once a week to ensure their being in a working condition.

If the paint is rubbed off any part of the carriage, the place should be patched over as soon as possible to prevent rust.

A thorough cleaning and lubricating of all standing working parts must take place once a month. In this cleaning all clotted grease must be removed where visible, by scraping, and the parts wiped with an oily rag. Where the carriage is much exposed and liable to accumulate dust or sand, it should not be left with much grease or oil upon it, but only sufficient to prevent rust, for which a very slight film will suffice. Care should always be taken, as far as possible, to exclude dust from the carriage when not in use.

Whenever and wherever fresh lubricant is applied, the old should first be wiped or scraped off, and the parts well worked to distribute the fresh lubricant before leaving them.

Before firing or drill, care should be taken that all nuts and screws are properly tightened up, that all working parts are in proper gear, and that all friction plates are accurately adjusted, and are not jammed.

If a nut or screw be removed, it should be slightly oiled before being replaced, and a few turns given to it by hand before using the spanner, to prevent damage by the threads crossing. A burr on the threads of a screw will prevent it being screwed home; the burr can be easily removed by means of a file. A hammer should never be used to tighten up screws or nuts.

Particular attention will be observed when removing or adjusting any gear not to indent or damage the component parts by rough usage; a hammer should never be used unless with a piece of wood or brass to transmit the blow.

In lubricating, the lubricating holes will be cleaned out with a wire and filled with oil, care being taken to replace the small screws, the heads of which must be *kept bright* so as to be readily seen.

A list of the oil holes in the carriage, stating their position and how access is obtained to them, is to be hung up in each emplacement, and none must be neglected.

These lists can be obtained on demand.

After filling the oil holes, the parts should be worked backwards and forwards until the oil shows on the shafting, fresh applications of oil being made if necessary.

The live roller axles of the Mark I carriage should be removed, cleaned, and lubricated. The axles can be taken out one by one.

The teeth of all pinions and toothed wheels should be greased.

The hydraulic buffer should be carefully examined before firing or drill to see that the cylinder contains the requisite quantity of fluid marked on the inscription plate, that there is no leakage at the glands, and that the piston rod is properly connected.

If the buffer leak at the gland, and tightening up the latter does not stop the leak, the packing must be renewed.

The buffer will be kept filled and periodically examined.

The whole of the gear must be removed by Ordnance artificers periodically, and all parts cleaned, keys adjusted, bolts and nuts tightened, lubricating holes thoroughly cleaned, the trunnion holes greased, and all parts properly lubricated, and any slight defect made good before reassembling the parts.

Whenever any parts are found broken, defective or deficient, which cannot be renewed by the artificer, fresh parts should be demanded at once. Any damage occurring at drill or practice should be at once reported with a view to its being made good without delay.

In all correspondence and reports relating to these carriages, their marks and register numbers should be quoted.

AMMUNITION.

PROJECTILES.

Nature.		Mark.	Bursting Charge.	Weight.
Shell	Common, pointed, cast steel ..	IV	lb. oz. 4 3½	lb. 45
	Armour-piercing, forged steel*	IV	1 12	45
Shot, paper	I, II, and III	—	45

Common Shell.

(*Plate XII.*)

The common shell is made of cast steel, 17·15 inches long, 4·694 inches diameter, with a head radius of two calibres. The head is pointed, and the base bored and screwed to take the No. 12 base fuze. Rotation is imparted by means of a broad Vavasseur driving band with two cannelures; the width of the cannelures is ·15 inch.

Armour-Piercing Shell.*

(*Plate XIII.*)

This shell is of forged steel, with a pointed head hardened for the penetration of armour plate. It is 14·3 inches long, with a head radius of two calibres. The base is bored to take the No. 12 base fuze. The driving band is the same as for the common shell.

Drill Shell.

This is made of wood, brought up to the weight of the service projectile by a lead core. It is fitted with a bolt which passes through the centre of the shell and is screwed to a gunmetal nut, which forms the point of the shell. The lower part of the bolt is formed to engage in a slotted spring bolt in the cartridge by which it is extracted when unloading. The base is protected by a copper plate, and the shell is fitted with two copper bands or rings to prevent it being injured by the rifling; the rear band is sufficiently large to prevent the shell being rammed too far home.

Bags, Burster.

These bags are made of dowlas, with neck and shoulder of shalloon.

* Existing stock to be used up for practice.

Plug, Base.

The base plug is made of gunmetal, and is of the same external shape as the fuze, but with a square keyhole in the head to take the "wrench, base plug." The head is covered by a lead cap (except in the case of the Mark IV shells). The cap is only used with filled shell. A hole .75 inch in diameter is cut in the bottom of the cap, to enable the plug to be unscrewed without removing the cap.

Paper Shot.

The Mark II is of papier-mâché, with a hard, black, polished surface on the exterior; it is in one piece, and has a conical head. The Mark III is made of wood pulp, and has a cylindrical head. The shot is brought up to the weight of the service projectile by being filled through the base with small shot and sawdust; the hole in the base is closed by a wooden plug. It has a band formed round the base to prevent its being rammed home too far.

INSTRUCTIONS FOR FILLING SHELL.

(See also "Magazine Regulations.")

Up-end the shell, pass the "holder, shell, 4.7 inch" over the base and secure it; remove the base plug with the "key, base fuze, and plug, Mark 1," and insert the bag in the usual way. Measure out the charge in the proportion of 1 lb. P. or Q.F. to 4 oz. of F.G.; drop in about half the P. (or Q.F.), then pour in about half the F.G., stirring the mixture with the filling rod and pressing steadily on it; the other half will then be inserted in the same way. Choke the neck of the bag, and, after cutting off the superfluous choke, push it in and to one side; then drop in four "bags, primer, filled, 7 drs.," or more if there is room. Lubricate the fuze or plug and screw it home.

When fuzes are covered with the lead cap, the latter must be set out on a mandril till it is a tight fit in the recess. It must then be pressed home under a press; *but on no account is it to be hammered. A hollow drift should be placed on the cap in pressing it home to ensure no pressure being exerted on the centre of the fuze head.*

If plugs are used instead of fuzes, the caps should have the letter P stamped on them, to show that a plug is in the shell.

Fixing Plugs and Fuzes.

When plugs or metal fuzes are screwed into shells, they will be lubricated with a mixture composed of whiting, mineral jelly, and castor oil. It is issued, ready mixed, in tin cylinders.

The mixture is to be applied to the threads of the fuze or plug with a brush in sufficient quantity to cover them, care being taken that it does not extend over the bottom.

Distinguishing Marks.

The bodies of shells will be painted black and marked as follows:—

A white band, $\frac{1}{2}$ inch wide, denoting steel, about 3 inches from the tip.

On the armour-piercing shell, a second white band, $\frac{1}{2}$ inch wide, $\frac{1}{2}$ inch below the first.

A red band, $\frac{1}{2}$ inch wide, denoting filled, below the upper white band.

The letters C.S. are stamped on the base of cast steel and F.S. on the base of forged steel shells.

The following additional marking in red paint, letters $\frac{3}{4}$ inch long, will be shown:—

The monogram of the station.

The word "Bag," if one has been used.

The date of filling.

The word "fuzed," if the shell is fuzed.

The letters P. or Q.F., 1 inch long, if filled with P. and F.G. or Q.F. and F.G.

Projectiles which are to be used for practice only will be marked with a yellow band half round the body.

Shells which have been emptied will be marked with the letter E, and the monogram of the station in red paint.

CARTRIDGES, Q.F., 4·7-INCH, 5-LB. 7-OZ. CORDITE, SIZE 20.

Empty (Plate XIV.)

The empty cartridges are suitable for either powder or cordite charges.

The Mark I empty cartridge is made of solid drawn brass, to the form shown in the plate. A hole is bored in the base, and screwed 14 threads per inch to take the "primer electric," or the "adapter." The inside of the cartridge is varnished. The lid is retained in its place by four projections formed round the top of the case and turned over the edge of the lid. The joint around the lid is sealed by "Pettman's" cement.

The Mark II empty cartridge differs from the Mark I in being thicker round the primer hole.

Lids.

The Mark I lid is special for the Mark I empty cartridge and is made of sheet brass .02 inch in thickness, the interior being filled with a lubricating mixture consisting of equal parts of beeswax and tallow, a brass cover, .02 inch in thickness, is placed over the lubrication and soldered.

The Mark II lid differs from the Mark I in being weakened by concentric grooves to ensure its breaking up in the gun, and has a flange round the edge which rests on the mouth of the cartridge; three slots are cut in the flange where the projections formed by notching the cartridge are bent over.

The Mark III lid (Plate XIV) is of white metal, and has six radial grooves in addition to the concentric grooves. The centre portion is also recessed for the reception of the label denoting the method of filling.

Filled.

The filled powder cartridge contains a charge of 12 lb. S.P. powder, which is placed loose in the empty cartridge, with a mill-board disc and a thin felt wad over it, the mouth being secured by a lid.

The filled cordite cartridge (Plate XV) contains a charge of 5 lb. 7 oz. of cordite, size 20, the various methods of filling being denoted by the numeral of the filled cartridge.

Mark II.—In this method of filling, the primer with igniter attached is first screwed into the cartridge, and the charge is then inserted, the igniter penetrating the centre. After the insertion of the felt and millboard wads (as in the powder cartridge) a paper cylinder, 4.69 inches long, is placed on the top to fill up the space between the charge and the lid.

The igniter consists of a paper cylinder closed at one end and open at the other. It is filled with 1 oz. 4 dr. R.F.G.² powder, over which a millboard wad pierced with five fire holes and a disc of shalloon are secured near the end, which is left open for securing the igniter to the end of the electric primer or the screwed end of the adapter.

Mark III.—In this cartridge the igniter consists of a shalloon bag filled with 1 oz. 4 dr. R.F.G.² powder and choked with silk twist. It is secured to a "dome" by stitching through the choke.

The dome is made of layers of calico and white paper perforated; it is secured to the charge by silk braid passing between the cordite sticks and round the circumference of the charge.

Mark IV.—This differs from the Mark III chiefly in the diameter of the base of the charge being increased by three circles of short cordite sticks enclosed in a shalloon bag, which is tied on with silk braid. In the centre of the charge is placed a cordite cylinder, 1.5 inch thick and 4 inches long, in which is inserted a cylindrical shalloon igniter containing 1 oz. 4 dr. of R.F.G.² powder. The igniter is stitched to the cordite cylinder with silk twist.

Mark V (Plate XIV).—This is similar to the Mark IV, but the sticks of cordite being slightly longer enables the brown-paper cylinder to be dispensed with.

The cartridges are issued filled and fitted with electric primers, in teak boxes, each of which holds six cartridges.

The cordite cartridges are stencilled "cordite" in red on the lid, and are packed the same as those filled with powder, but the labels are printed in red.

When new cartridges are filled they will be stamped with the letter "P" or "C" to denote whether the charge consists of powder or cordite, followed by "F" or "R," in smaller letters, to denote whether "full" or "reduced."

When again filled, should the explosive used be the same as in the previous charge, it will only be necessary to add a small "F" or "R" (to denote whether full or reduced), but if the explosive is not the same as in the previous charge the letter "C" or "P," as the case may be, should be inserted before the small "F" or "R," e.g., PFFR CFR.

This would show that :--

- First was a full charge of powder.
- Second was a full charge of powder.
- Third was a reduced charge of powder.
- Fourth was a full charge of cordite.
- Fifth was a reduced charge of cordite.

Empty cartridges must be cleaned immediately after firing. The fired cartridges should be immersed and well washed in clean fresh water, which should, if the cartridges have been fired with cordite, contain $\frac{1}{2}$ oz. of soda to the gallon. They should then be rubbed inside and out with a mop (formed by a piece of rag tied to the end of a stick), rinsed in clean water, and wiped perfectly dry.

Soda may be used with cartridges which have been fired with powder, but its use is not essential in this case. When perfectly dry they will then be re-packed in the boxes in which they were supplied and returned to the Ordnance Store as soon as possible for relacquering and re-forming, which should be done with the least possible delay, as cartridges when left unlacquered deteriorate rapidly.

The fired cartridges are not on any account to be repacked in boxes containing unfired cartridges.

Drill Cartridge.

This consists of the brass service case, in which a wood plug is inserted to bring it up to the service weight. The mouth of the case is closed by a brass plate, under which is a spring locking bolt. On loading, the spring bolt in the cartridge engages with the projection on the base of the shell, and when the cartridge is withdrawn the shell is extracted along with it. The shell is released from the cartridge by pressing the spring bolt with the thumb.

Primers, Electric, Marks III and IV.

(Plate XVI.)

Mark III consists of the following parts:—Body, contact disc, ebonite insulator, cone, three poles, two platinum wire bridges, cylinder, mealed powder, brass washer, and cork plug.

The *body* is of manganese bronze. The head is milled, and has two slots cut in it to fit the "keys, inserting and removing primers."

The body below the shoulder is screwed for a length of 0.8 inch to fit the cartridge. The end of the body is reduced in diameter for a length of 0.3 inch, and screwed to receive the cylinder. The face of the body between the two screwed portions is cupped out for a depth of 0.25 inch to form a gas-check. The head is recessed in the centre to receive the insulator and contact disc.

The inside of the body is turned out to the form shown in the plate.

The *ebonite insulator* is inserted in the head in two parts—viz., a disc and a ring. It is held in position by the metal of the head being burred over.

The *contact disc* is of crown metal, and is placed between the two parts of the insulator.

The *cone* is of brass insulated with oiled silk. The contact disc is connected to the centre of the cone by a piece of insulated copper

wire, which is inserted and soldered into the disc and cone, and coiled as shown in the plate.

The *poles* are of crown metal, the larger one fixed in the centre of the cone, the two smaller ones in the end of the body, about 0.14 inch apart. Two platinum wires are each soldered with pure tin to the end of the centre pole, then separately stretched across and soldered with pure tin, one wire to each pole in the body. The resistance offered by the double wires is from 0.6 to 0.9 ohm.

The *cylinder* is of brass, screwed inside at the top to fit over the end of the body, to which it is secured by a small set screw. It is recessed at the tapered end to take the brass washer and cork plug.

The *mealed powder* consists of two parts by weight of gun-cotton dust and three of mealed powder. The whole of the space round the centre pole and the inside of the cylinder is filled with it.

The primer is closed by a *brass washer* with a hole through the centre and a *cork plug*, the latter being secured with shellac cement and varnished with shellac varnish.

Mark IV differs from *Mark III* as follows:—

The *ebonite insulator* is cupped out, and the recess in the head of the *body* is slightly undercut to receive it.

The *contact disc* is of white metal, and is placed in the bottom of the *ebonite cup*, which is then filled up with white metal, well pressed, so as to expand the ebonite cup into the undercut recess.

The *cone* is secured in position in the body by an ebonite washer and brass collar.

A few strands of pure guncotton are placed in the powder charge, between the wires, to facilitate ignition.

Filled cartridges are issued with primers in them. Spare primers are packed 10 in a tin cylinder, 20 cylinders being packed in a wooden box, with lid attached by screws.

Adapter.

The adapter is for use when the gun is fired by mechanical means. It is made of hardened steel, similar in external form to the service electric primer, with the interior shaped to take the ordinary vent-sealing percussion tubes, and has a fire-hole in the bottom. The *Mark II* is shorter than the *Mark I*, and is screwed at the point to fit the igniter of the *Mark II* filled cartridge.

Dummy Primer.

The dummy primer is made of solid brass, to the same external shape as the service electric primer, with the exception of the head, which is octagonal. A disc of hard india-rubber is secured in the head so as to ensure insulation on release of the striker. It is stamped "Dummy" on the head, and is used for drill purposes.

Keys, Inserting and Removing Primers.

(Plate XVII.)

These are made of mild steel to the form and dimensions shown in the plate. They are used for inserting and removing the primers and adapters in the cartridge.

Cartridge Box.

This is made of deal, with ends and cleats of elm, and rope handles. The interior is fitted with six conical zinc cases, each taking one cartridge, and being closed hermetically by a zinc lid with india-rubber washer, which is compressed when the lid of the box is screwed down. The sides, top, and bottom are strengthened by cleats placed obliquely, so that they fit along the cleats of the next box, and allow closer stowage. The box is painted lead colour.

Dimensions, &c.

Exterior, over all	{	Length	25.25 inches.
		Depth	20.25 "
		Width	17.75 "

FUZE, PERCUSSION, BASE, MEDIUM, NO. 12, MARK I,

(Plate XVIII.)

This fuze consists of the following parts: body, *a*; needle pellet, *b*; centrifugal bolt, *c*; pressure-plate, *d*; with spindle, *e*; and nut, *f*; screwed cap with detonator and plug, *g*; phosphor bronze spring, *h*; brass spring, *k*; lead washer, *m*; and four brass screws.

The body is made of manganese bronze, screwed outside 12 threads per inch (left hand) to fit the fuze hole of the shell, and having a hole bored through the side, as shown on the plate, to take a small brass spring which works against the centrifugal bolt; the hole is closed by a brass screw plug. The base of the fuze (which is recessed and undercut round the edge) is closed by the copper pressure-plate, which is secured in position by being pressed into the undercut portion of the recess. The head of the fuze is closed by a cap screwed into the body, and containing a detonator in the centre of the underside, the body of the cap being bored out and screwed to take the plug.

The plug, which forms a magazine, contains a compressed pellet of $10\frac{1}{2}$ grains of R.F.G.² powder, and is screwed into the cap. It has four holes bored through the head to communicate the flash to the interior of the shell. The detonator communicates with the magazine by fire holes through the metal above it.

The interior of the fuze contains the spindle, needle pellet, centrifugal bolt, and spring.

The pellet is hollow, the bolt passes through the lower end, and the upper is reduced in diameter to form a seating for the spring, and screwed internally to take the needle plug. The bottom of the spindle is screwed into a boss in the centre of the pressure-plate, and the head has a brass nut screwed on to it, which locks into the centrifugal bolt. The bolt is hollow at one end, and has a projection fitting into a slot in the side of the body of the fuze.

The action of the fuze is as follows:—On discharge the pressure-plate is driven in, carrying the spindle with it; the head of the spindle being forced down, releases the centrifugal bolt and leaves it free to move. The rotation of the shell causes the bolt to be spun out, compressing the spring in rear, and leaving the needle pellet free to move forward on impact, when the needle strikes the detonator and so fires the fuze.

These fuzes are packed, one in a tin cylinder.

Weight, 1 lb. 4½ oz.

TUBES

Tube, Vent-sealing, Percussion.

(Plate XIX.)

Mark IV.—This consists of a body, anvil, striker, washer, percussion cap, copper disc, two paper discs, and a cork plug. The body is made of solid drawn brass, a hole is drilled through the head to receive the striker, which is secured in position by being riveted into the countersunk washer, as shown in the plate. The upper part of the chamber is screwed and fitted with an anvil, on which is placed the percussion cap, the upper surface of which is in contact with the striker; a small central and two diagonal fire-holes are drilled through the anvil. The remainder of the space in the tube is filled with loose pistol powder, and the bottom is closed with a paper disc and cork plug, coated with varnish.

On firing the gun the point of the striker of the percussion lock drives the striker of the tube, together with the percussion cap, on to the anvil, thus firing the tube.

Mark III is the same as Mark IV, except that the bottom of the tube is closed with a paper disc and perforated brass ball, embedded in sulphur and secured with shellac.

Mark II differs from Mark IV in not having the diagonal fire holes in the anvil.

Tube, Vent-sealing, Percussion, Drill.

(Plate XIX.)

This tube is made of gun-metal, the interior being bored out, and the head fitted to receive the coned india-rubber plug as shown in the plate. The lower portion is closed by a gun-metal plug.

EXTRACTOR CARTRIDGE.

This is made of steel about 10 inches long, having a claw at one end to be fixed under the head of the primer or adapter. The handle is roughened and has a loop of white cord for securing it to the wrist.

RANGE TABLE FOR 4.7-INCH Q.F. GUN.

Based on Practice of 28.8.88.

Charge.. .. { weight, 12 lbs.
gravimetric density, $\frac{248}{1118}$
nature, S.P.
Projectile nature, common shell, weight, 45 lbs.
Muzzle velocity 1786 f.s.
Jump 2 minutes.

Remaining velocity.	To strike an object 10 feet high, range must be known within	Slope of descent.		5' elevation or deflection alters point of impact.		Elevation.	Range.	Fuze scale for middle sensitive fuze.	50 per cent. of rounds should fall in.			Time of flight.
		1 in	yards	yards	yards				Length.	Breadth.	Height.	
f.s.	yards.	1 in	yards	yards	yards	yards	yards	yards	yards	yards	yards	secs.
1714	953	572	92	0.14	0.4	100	100	10	0.1	0.1	0.1	0.21
1710	476	286	90	0.29	0.10	200	200	10	0.1	0.1	0.1	0.42
1673	316	190	88	0.43	0.16	300	300	10	0.1	0.1	0.1	0.63
1637	228	137	86	0.58	0.23	400	400	10	0.2	0.1	0.1	0.85
1602	183	110	84	0.72	0.29	500	500	11	0.2	0.1	0.1	1.06
1568	153	92	83	0.87	0.36	600	600	11	0.2	0.2	0.2	1.28
1535	127	76	81	1.01	0.42	700	700	11	0.3	0.2	0.2	1.49
1503	110	66	79	1.16	0.49	800	800	11	0.3	0.2	0.2	1.71
1471	97	58	77	1.31	0.56	900	900	12	0.3	0.2	0.2	1.93
1440	87	52	76	1.45	1.3	1000	1000	12	0.4	0.3	0.3	2.15
1409	77	46	74	1.60	1.9	1100	1100	12	0.4	0.3	0.3	2.37
1378	70	42	73	1.74	1.16	1200	1200	12	0.5	0.3	0.3	2.59
1348	63	39	71	1.89	1.23	1300	1300	12	0.5	0.4	0.4	2.81
1319	57	34	70	2.03	1.30	1400	1400	13	0.5	0.4	0.4	3.04
1291	52	31	68	2.18	1.37	1500	1500	13	0.6	0.4	0.4	3.26
1263	48	29	67	2.32	1.45	1600	1600	13	0.6	0.5	0.5	3.49
1237	45	27	65	2.47	1.52	1700	1700	11	0.6	0.5	0.5	3.71
1213	40	24	64	2.61	2.0	1800	1800	11	0.7	0.6	0.6	3.94
1190	38	23	62	2.76	2.8	1900	1900	12	0.7	0.6	0.6	4.17
1168	35	21	61	2.91	2.16	2000	2000	13	0.8	0.7	0.7	4.40
1148	33	26	59	3.05	2.24	2100	2100	13	0.8	0.7	0.7	4.63
1129	30	18	58	3.21	2.33	2200	2200	14	0.9	0.8	0.8	4.86
1111	28	17	57	3.34	2.41	2300	2300	15	0.9	0.9	0.9	5.09
1094	27	16	56	3.49	2.50	2400	2400	15	1.0	1.0	1.0	5.33
1077	25	15	54	3.63	2.59	2500	2500	16	1.0	1.0	1.0	5.57
1061	23	14	53	3.78	3.8	2600	2600	17	1.1	1.1	1.1	5.81
1045	22	13	52	3.92	3.17	2700	2700	17	1.1	1.2	1.2	6.05
1030	20	12	51	4.07	3.27	2800	2800	18	1.2	1.3	1.3	6.30
1016	20	12	50	4.21	3.37	2900	2900	19	1.2	1.4	1.4	6.55
1003	18	11	49	4.36	3.47	3000	3000	19	1.3	1.6	1.6	6.81
991	18	11	48	4.51	3.57	3100	3100	20	1.3	1.7	1.7	7.07
980	17	10	47	4.65	4.8	3200	3200	21	1.4	1.9	1.9	7.33
970	17	10	46	4.80	4.19	3300	3300	21	1.1	2.0	2.0	7.60
960	15	9	45	4.94	4.30	3400	3400	22	1.5	2.2	2.2	7.87
950	15	9	44	5.09	4.41	3500	3500	22	1.5	2.4	2.4	8.14
940	13	8	43	5.23	4.53	3600	3600	23	1.6	2.6	2.6	8.42
930	13	8	42	5.38	5.5	3700	3700	24	1.6	2.8	2.8	8.70
920	13	8	41	5.52	5.17	3800	3800	25	1.7	3.0	3.0	8.98
911	12	7	40	5.67	5.29	3900	3900	25	1.7	3.2	3.2	9.26
902	12	7	40	5.81	5.41	4000	4000	26	1.8	3.5	3.5	9.55

Remaining velocity.	To strike an object 10 feet high, range must be known within.	Slope of descent.	5' elevation or deflection alters point of impact.		Elevation.	Range.	Fuze scale for middle sensitive fuze.	50 per cent. of rounds should fall in.			Time of flight.
			Range.	Laterally or vertically.				Length.	Breadth.	Height.	
f.s.	yards.	1 in	yards.	yard.	° /	yards.		yards.	yards.	yards.	secs.
893	12	7	39	5.96	5 53	4100	26 1/2	26	1.9	3.7	9.83
885	12	7	39	6.11	6 6	4200	27 1/2	27	2.0	4.0	10.12
876	10	6	38	6.25	6 19	4300	28 1/2	27	2.0	4.3	10.41
867	10	6	38	6.40	6 32	4400	29 1/2	28	2.1	4.6	10.70
858	10	6	38	6.54	6 45	4500	30 1/2	29	2.1	4.9	11.00
850	10	6	37	6.69	6 58	4600		30	2.2	5.3	11.30
842	8	5	37	6.83	7 11	4700		31	2.3	5.6	11.61
834	8	5	36	6.98	7 25	4800		32	2.4	6.0	11.92
826	8	5	36	7.13	7 39	4900		33	2.4	6.4	12.23
818	8	5	36	7.27	7 53	5000		34	2.5	6.9	12.55
811	8	5	35	7.42	8 7	5100		35	2.6	7.3	12.87
804	8	5	35	7.56	8 21	5200		36	2.7	7.8	13.19
797	8	5	35	7.71	8 35	5300		37	2.7	8.3	13.51
790	7	4	35	7.85	8 50	5400		38	2.8	8.8	13.83
783	7	4	34	8.00	9 4	5500		39	2.9	9.3	14.15
776	7	4	34	8.14	9 19	5600		40	3.0	9.9	14.48
769	7	4	34	8.29	9 34	5700		41	3.0	10.4	14.81
762	7	4	34	8.43	9 49	5800		43	3.1	11.0	15.14
755	7	4	33	8.58	10 4	5900		44	3.2	11.6	15.47
748	7	4	33	8.73	10 19	6000		45	3.3	12.2	15.80
742	7	4	33	8.87	10 36	6100		46	3.4	12.9	16.14
736	7	4	33	9.01	10 52	6200		48	3.5	13.6	16.48
730	5	3	32	9.16	11 9	6300		49	3.6	14.3	16.83
724	5	3	32	9.30	11 26	6400		51	3.7	15.1	17.18
718	5	3	32	9.45	11 43	6500		52	3.8	15.9	17.54
712	5	3	32	9.60	12 1	6600		54	4.0	16.8	17.90
706	5	3	31	9.74	12 19	6700		55	4.1	17.7	18.27
700	5	3	31	9.89	12 38	6800		57	4.2	18.6	18.64
694	5	3	31	10.03	12 57	6900		58	4.3	19.5	19.02
689	5	3	31	10.18	13 17	7000		60	4.5	20.5	19.40
683	5	3	31	10.32	13 37	7100		62	4.6	21.5	19.79
678	5	3	30	10.46	13 58	7200		64	4.8	22.5	20.18
673	5	3	30	10.60	14 19	7300		65	4.9	23.6	20.58
668	5	3	30	10.75	14 41	7400		67	5.1	24.7	20.99
663	5	3	30	10.89	15 4	7500		69	5.2	25.8	21.41
658	5	3	30	11.04	15 27	7600		71	5.4	27.0	21.84
						7700					
						7800					
						7900					
						8000					

RANGE TABLE FOR 4.7-INCH Q.F. GUN.

Based on Practice and Calculation.

Charge { weight, 5 lb. 7 oz.; cordite, size 20.
gravimetric density, $\frac{54.8}{0.906}$.
Projectile, weight, 45 lb.

Muzzle velocity, 2150 f.s.
Nature of mounting, central pivot.
Jump, + 3½ minutes.

Remaining velocity.	To strike an object 10 feet high, range must be known within	Slope of descent.	5 minutes' elevation or deflection alters point of impact.		Elevation.	Range.	Fuze scale for time and percussion, middle, No. 54, Marks I, II, or III.	Time of flight.
f.s.	yards.	1 in	yards.	yards.	° ' "	yards.		secs.
2107	555	573	129	0.14	0 8	100		0.1
2064	573	344	127	0.29	0 12	200		0.3
2022	409	215	125	0.43	0 16	300	I	0.4
1982	317	191	123	0.58	0 20	400	II	0.6
1943	260	156	121	0.72	0 24	500	III	0.7
1905	220	132	119	0.87	0 28	600		0.9
1867	185	111	117	1.01	0 33	700		1.1
1830	158	95	115	1.16	0 38	800		1.3
1792	140	84	113	1.31	0 43	900		1.4
1755	125	75	111	1.45	0 48	1000	3½	1.6
1717	112	67	108	1.60	0 53	1100	3½	1.8
1680	102	61	104	1.74	0 58	1200	4	2.0
1643	90	54	100	1.89	1 3	1300	4½	2.1
1606	82	49	96	2.03	1 8	1400	4½	2.3
1570	74	45	93	2.18	1 13	1500	5½	2.5
1535	68	41	91	2.32	1 18	1600	5½	2.7
1502	62	37	89	2.47	1 23	1700	6	2.9
1470	57	34	86	2.61	1 28	1800	6½	3.1
1440	52	31	84	2.76	1 33	1900	6½	3.3
1410	47	28	81	2.91	1 38	2000	7	3.5
1380	43	26	79	3.05	1 44	2100	7½	3.7
1351	40	24	77	3.20	1 50	2200	7½	3.9
1323	38	23	75	3.34	1 56	2300	8½	4.1
1296	35	21	73	3.49	2 2	2400	8½	4.3
1271	32	19	71	3.63	2 8	2500	9	4.5
1248	30	18	69	3.78	2 15	2600	9½	4.7
1225	28	17	67	3.92	2 22	2700	10	4.9
1202	27	16	65	4.07	2 29	2800	10½	5.2
1181	25	15	63	4.21	2 36	2900	10½	5.4
1160	24	14	61	4.36	2 44	3000	11½	5.7
1140	22	13	60	4.51	2 52	3100	11½	6.0
1120	21	12	59	4.65	3 0	3200	12½	6.2
1102	20	12	58	4.80	3 8	3300	12½	6.4
1085	19	11	56	4.94	3 16	3400	13½	6.7
1070	18	11	55	5.09	3 26	3500	13½	7.0
1055	17	10	54	5.23	3 36	3600	14½	7.3
1040	16	9.6	52	5.38	3 46	3700	14½	7.5
1025	15	9.2	51	5.52	3 56	3800	15½	7.8
1012	15	8.8	50	5.67	4 6	3900	15½	8.1
1000	14	8.4	49	5.81	4 16	4000	16½	8.4
989	14	8.0	48	5.96	4 26	4100	17	8.7
978	13	7.7	47	6.11	4 36	4200	17½	9.0
967	13	7.3	46	6.25	4 46	4300	18	9.3
957	12	7.0	45	6.40	4 57	4400	18½	9.6
947	12	6.8	45	6.54	5 9	4500	19½	9.9

Remainder velocity.	To strike an object 10 feet high, range must be known within	Slope of descent.	5 minutes' elevation or deflection alters point of impact.		Elevation.	Range.	Fuze scale for time and percussion, middle, No. 54, Marks I, II, or III.	Time of flight.
			Range.	Laterally or vertically.				
f.s.	yards.	1 in	yards.	yards.	° ' "	yards.		secs.
937	11	6.5	44	6.69	5 21	4600	20	10.2
927	11	6.3	43	6.83	5 33	4700	20½	10.5
918	10	6.0	42	6.94	5 45	4800	21½	10.8
909	10	5.8	41	7.13	5 57	4900	21¾	11.1
900	9	5.6	41	7.27	6 9	5000	22½	11.4
891	9	5.4	40	7.42	6 22	5100	23	11.7
882	9	5.3	39	7.56	6 35	5200	23½	12.0
874	8	5.0	39	7.71	6 48	5300	24½	12.3
866	8	4.9	38	7.85	7 1	5400	25½	12.6
858	8	4.7	38	8.00	7 14	5500	25½	12.9
850	7	4.5	37	8.14	7 27	5600	26½	13.2
842	7	4.4	36	8.29	7 40	5700	27½	13.5
834	7	4.3	36	8.43	7 54	5800	28	13.9
826	7	4.1	35	8.58	8 8	5900	28½	14.2
819	7	4.0	34	8.73	8 22	6000	29½	14.6
811	6	3.8	34	8.87	8 37	6100		14.9
804	6	3.7	33	9.01	8 52	6200		15.3
797	6	3.6	33	9.16	9 7	6300		15.6
790	6	3.5	32	9.30	9 22	6400		16.0
783	6	3.4	32	9.45	9 37	6500		16.3
776	5	3.3	31	9.60	9 53	6600		16.7
769	5	3.2	31	9.74	10 9	6700		17.0
762	5	3.1	30	9.89	10 25	6800		17.4
756	5	3.0	30	10.03	10 42	6900		17.8
750	5	2.9	29	10.18	10 59	7000		18.2
744	5	2.8	29	10.32	11 16	7100		18.5
738	4	2.7	29	10.46	11 33	7200		18.9
732	4	2.6	28	10.60	11 50	7300		19.2
726	4	2.5	28	10.75	12 8	7400		19.6
720	4	2.5	27	10.89	12 26	7500		20.0
714	4	2.4	27	11.04	12 45	7600		20.4
708	4	2.3	26	11.19	13 4	7700		20.8
702	4	2.3	26	11.34	13 23	7800		21.2
696	4	2.2	25	11.48	13 42	7900		21.6
689	4	2.2	25	11.63	14 1	8000		22.0
683	3	2.1	25	11.77	14 21	8100		22.4
677	3	2.1	25	11.92	14 41	8200		22.8
671	3	2.0	24	12.07	15 1	8300		23.2
665	3	2.0	24	12.22	15 21	8400		23.6
659	3	1.9	24	12.36	15 42	8500		23.9
653	3	1.9	23	12.51	16 3	8600		24.3
647	3	1.8	23	12.65	16 24	8700		24.9
641	3	1.8	23	12.80	16 46	8800		25.4
635	3	1.7	22	12.94	17 8	8900		25.8
629	3	1.7	22	13.09	17 30	9000		26.3
624	3	1.6	22	13.24	17 52	9100		26.7
618	3	1.6	22	13.39	18 14	9200		27.2
612	3	1.6	22	13.53	18 36	9300		27.7
607	3	1.5	21	13.67	18 58	9400		28.1
602	2	1.5	21	13.81	19 20	9500		28.5
597	2	1.5	21	13.96	19 42	9600		28.9
592	2	1.4	20	14.11	20 4	9700		29.3
587	2	1.4	20	14.26	20 26	9800		29.8
582	2	1.4	20	14.40	20 48	9900		30.2
577	2	1.3	20	14.55	21 10	10000		30.7

DRILL FOR Q.F. 4.7-INCH GUNS.

DETACHMENT.

The gun detachment consists of a Gun Captain, and three other gun numbers.

TO TELL OFF.

The detail for falling in and telling off is the same as laid down at page 246, "Garrison Artillery Drill," Vol. I, except that there is no gun layer.

GENERAL DUTIES.

The Gun Captain commands and is responsible to the Gun Group Commander for the regular and efficient service of his gun in all respects; he elevates, traverses, lays, and fires when electric firing is used. When percussion firing is used he gives the command to fire to No. 3.

No. 2 opens the breech, extracts cartridge case, closes the breech, and with electric firing gives "Ready," when clear of the recoil.

No. 3 brings up and loads cartridges. With percussion firing he inserts the percussion tube (with single-motion mechanism cocks the striker and hooks the lanyard to the trigger), gives "Ready," and fires on the command from the Gun Captain.

No. 4 brings up and loads projectiles.

In addition to the gun detachment, an ammunition supply party of four men is required for each gun. Their duties are:—

To bring up ammunition from the shell and cartridge stores to the expense recesses and to remove and stack empty cartridges.

The ammunition supply party is not essential to the working of the gun when the necessary supply of ammunition has been provided and remains unexpended.

TO PREPARE FOR ACTION AND EXAMINE GUN.

<i>Gun Group Commander.</i>	<i>Gun Captain.</i>
".... Group."	".... Gun."
"Prepare for action and examine gun."	"Prepare for action."
	".... Gun."
	".... Examine gun."

At "Prepare for action," each number brings up his stores as under:—

Gun Captain.—Sights, spare striker (electric and percussion), electric firing battery, if not on the mounting, and a screwdriver.

No. 2.—Cartridge extractor, lever lengthening cam lever (for guns fitted with cam lever), McMahon spanner, and wrenches for breech mechanism and buffer.

No. 3.—Percussion tubes, lanyard (if not on the mounting), oil can and waste; for drill,—a drill cartridge, tube, and adapter,

No. 4.—For drill—a drill shell.

The ammunition supply party will bring up the following stores :—

1 holder, cartridge.	
1 brush for cleaning shell.	
1 key, inserting primer	} per 2 guns.
1 key, removing primer	
1 grease pot.	

The Gun Captain fixes the sights and attaches the firing battery to the mounting, if not already on.

No. 2 attaches the cartridge extractor to his left wrist.

Gun Captain, Nos. 2 and 3 arrange their other stores handy for use and clear of the gun.

No. 4 at drill, places the drill shell in the shell recess.

The ammunition supply party, after placing their stores handy for use, fill up the cartridge and shell recesses in the emplacement (if not already full), and prepare to continue the supply of ammunition.

"*Examine gun.*"—The Gun Captain now gives "... Examine gun," and sees :—That the sights fit and work properly, and that the sight carrier, or bracket, is firmly attached to the mounting; that the firing mechanism, both electric and percussion, is in proper order; that the buffer is properly connected, not leaking, and contains the correct amount of oil; that the clip plates (if any) are secured; that the elevating and traversing gear is oiled and in working order; that the capsquares are properly secured, and that the recesses on the top of the cradle are filled with oil.

He receives reports from the numbers responsible of any irregularity or deficiency in connection with the gun, mounting, or stores.

No. 2 opens the breech; he raises the cam lever to its full extent with his right hand, forces it as far from him as it will go, and still holding the lever swings the breech screw and carrier clear from the breech (with single-motion mechanism takes the handle of the lever in his right hand, and pulls it toward him as far as it will go).

He then examines the breech screw and the threads of the breech, sees that they are clean and free from burrs, and lubricates the threads with a slight film of oil.

The Gun Captain sees that the bore is clear.

No. 4 loads an empty cartridge fitted with an electric primer. No. 2 then closes the breech; he takes hold of the cam lever in his right hand, swings the breech screw into the gun, preventing it rebounding with his left hand, and folds down the cam lever (with single-motion mechanism, takes hold of the lever with his left hand, and pushes it away from him as far as it will go).

The Gun Captain then tests the firing circuit, by firing the primer.

No. 2 opens the breech, extracts the cartridge case, and closes it again.

After each number has completed his work, he takes post as follows :—

Gun Captain.—In rear of the shoulder-piece.

No. 2.—On the right of the gun facing the breech.

No. 3.—On the left of the gun facing the breech.

No. 4.—At the shell recess.

TO LOAD.

<i>Gun Group Commander.</i>	<i>Gun Captain.</i>
".... Group."	".... Gun."
".... Shell, load."	".... Shell, load."

Electric firing.—No. 2 opens the breech (extracts the empty cartridge, and lays it down using the extractor with his left hand).

No. 4 supplies himself with a projectile, places it in the bore and then supplies himself with another projectile.

No. 3 supplies himself with a cartridge, thrusts it into the bore, forcing the projectile home in front of it, and then supplies himself with another cartridge.

No. 2 closes the breech as soon as the cartridge is in, and gives the word "Ready" when clear of the recoil.

Percussion firing.—As above, with the following exceptions:—

No. 3, with single motion mechanism, unhooks the lanyard (if hooked), brings up and loads the cartridge (with adapter).

No. 2 closes the breech. When by this means it is ascertained that the charge is properly home, he opens the breech with care, so as not to work the extractor.

No. 3 inserts the percussion tube.

No. 2 closes the breech carefully to avoid jarring the tube.

No. 3, as soon as No. 2 is clear of the recoil, seizes the lanyard and gives "Ready."

(With single motion mechanism after the breech is finally closed, No. 3 cocks the striker, hooks the lanyard to the trigger, and gives the word "Ready" when clear of the recoil).

TO FIRE.

Gun Group Commander.

".... Group."	"Slow fire."
".... Yards."	".... Gun shot."
".... Minutes (R. or L.)."	
or	
".... Group."	"Rapid fire."
".... Yards."	
".... Minutes (R. or L.)."	

The Gun Captain adjusts the sights to the elevation and deflection ordered. He lays the gun on the target, giving elevation by the hand wheel, and traversing by the gear or shoulder piece as most convenient. The traversing gear is put in or out of action by No. 2.

"Slow fire."—"Slow fire" is only a caution, being followed by ".... Gun shot" when the Gun Group Commander wishes a gun to be fired. This order of fire may be used for ranging purposes, or when great rapidity of fire is not desirable.

"Rapid fire."—"Rapid fire" is an order to commence firing, and the fire is to be continued until stopped by "Stand fast," or "Cease firing."

Electric firing.—With electric firing, the Gun Captain, after No. 2 has given "Ready," and his gun is properly laid, will fire by pressing the trigger. At "Slow fire" he fires on the command

"Shot." At "Rapid fire" he fires at his own discretion, and continues the fire until "Stand fast," or "Cease firing," is ordered.

Percussion firing.—As above, except that the Gun Captain gives " ... Gun—Fire" after No. 3 has given "Ready." No. 3 pulls the lanyard and fires the gun.

Percussion firing will only be used in the case of failure of the electric firing mechanism.

After firing, the gun is immediately reloaded with the same projectile without word of command.

At both orders of fire all guns will be kept laid on the target.

Use of whistle.—The Gun Group Commander will use a whistle with the following significations:—

One blast—"Stand fast."

Two blasts—"Cease firing."

"Stand fast" is only a momentary cessation of fire to enable orders to be heard. With this exception the service of the guns is to proceed as usual, and Gun Captains are to follow the target. Fire is to be continued immediately orders have been received and acted on.

MISSFIRES.

At electric firing.—The Gun Captain presses the trigger again. If the gun does not fire, after a pause of one minute No. 2 opens the breech and extracts the cartridge, No. 3 loads a fresh one, No. 2 closes the breech. If a missfire occurs with the new cartridge percussion firing must be resorted to, and the electric mechanism examined, and put right when time permits.

At percussion firing.—No. 2 recocks the striker by raising and lowering the cam lever (with single motion mechanism No. 3 recocks), No. 3 again pulls the lanyard on the command from the Gun Captain. Should the gun again miss fire, No. 2, after a pause of one minute, opens the breech very gently. The Gun Captain examines the tube, and, if it has been struck, the cartridge will be carefully extracted and placed well clear of the group. It will be destroyed as soon as possible by being thrown into deep water. If the tube has not been struck the Gun Captain will change the striker.

CEASE FIRING.

Electric firing.—No. 2 opens the breech.

Percussion firing.—No. 2 opens the breech. (With single motion mechanism No. 3 unhooks the lanyard, No. 2 opens the breech, No. 3 releases the striker.)

(If it is not desired to commence firing immediately after loading, "Cease firing" will be ordered.)

No. 2 will close the breech again on the order "Slow fire" or "Rapid fire."

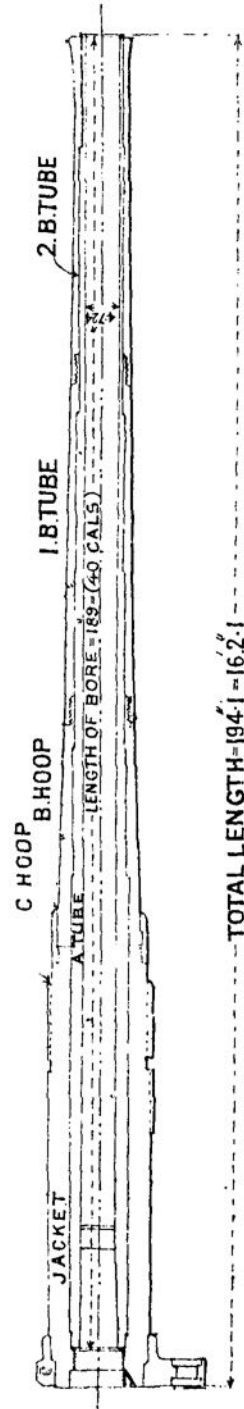
CEASE FIRING AND REPLACE STORES.

The Gun Captain sees that the gun is depressed to about 4 degrees. The stores are replaced by the numbers who brought them up. After replacing stores the detachment falls in at the rear of the emplacement.

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— ORDNANCE, Q.F. 4.7-INCH MARK II. —
 — STEEL, 41 CWT. —

SCALE $\frac{1}{28}$

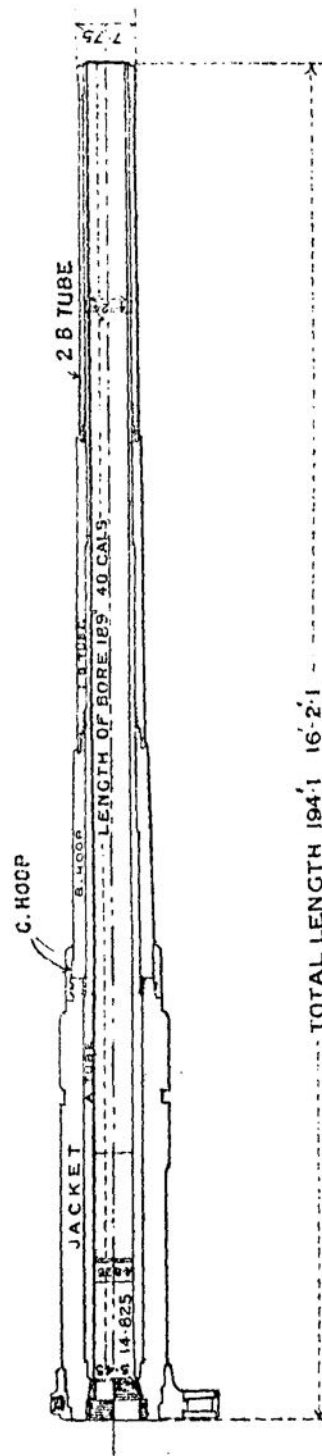


SECTION OF GROOVE
 FULL SIZE

ORDNANCE Q. F. 4.7-INCH MARK III.

STEEL: 41-CWT.

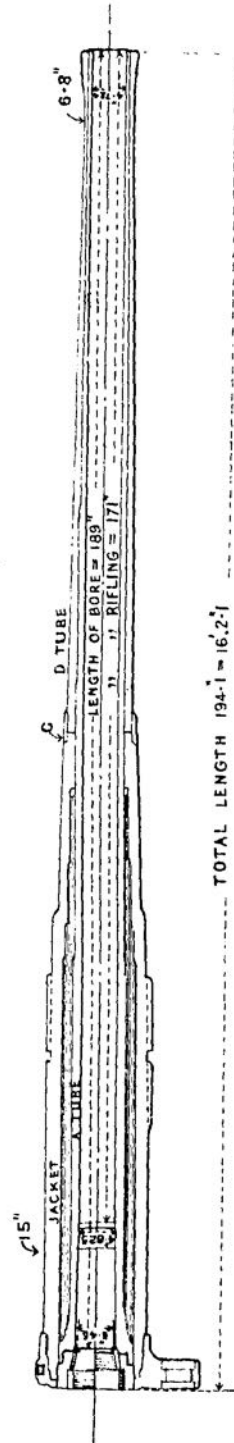
Scale $\frac{1}{2}$ "



SECTION OF GROOVE
Full Size.

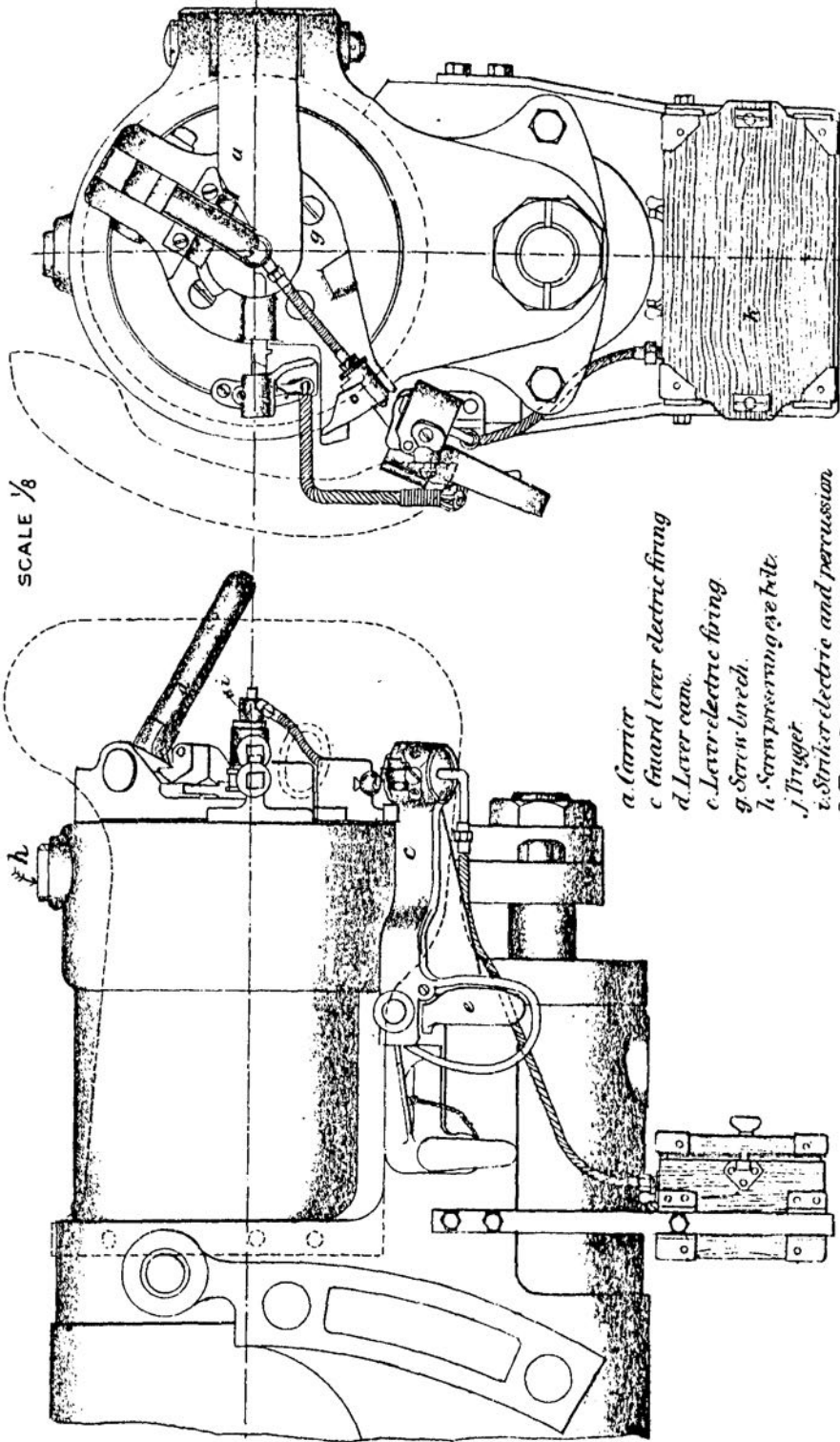
ORDNANCE, Q. F. 4.7 INCH, MARK IV.
STEEL (WIRE CONSTRUCTION,) 42 CWT.

Scale $\frac{1}{28}$.



ORDNANCE, QUICK-FIRING, 4.7 INCH, MARK I, II & III.
BREECH CLOSING MECHANISM.

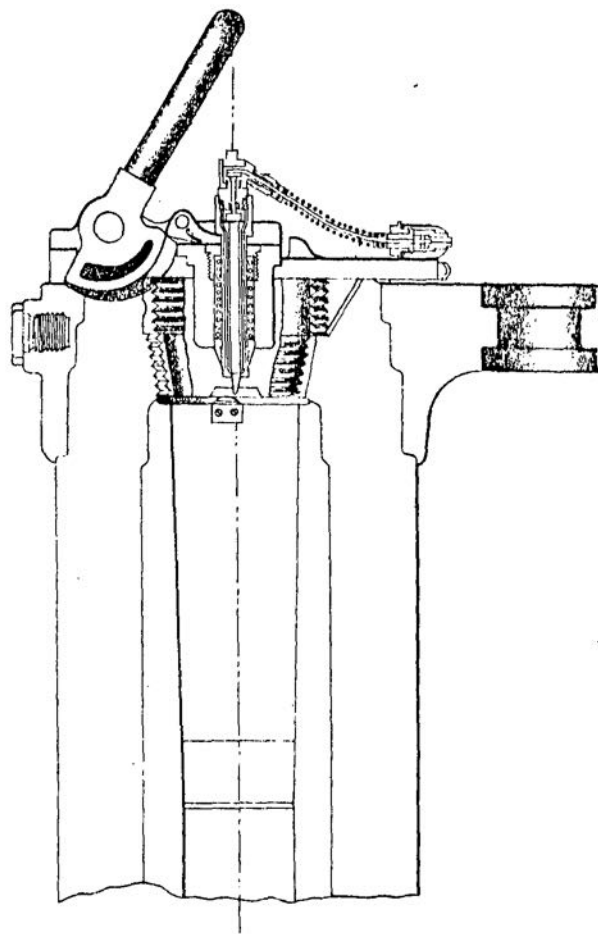
SCALE $\frac{1}{8}$



- a. Carrier
- c. Guard lever electric firing
- d. Lever can.
- e. Lever electric firing
- g. Screw breech.
- h. Screw pressing eye bolt.
- j. Trigger
- i. Striker electric and percussion
- k. Box, battery, electric.

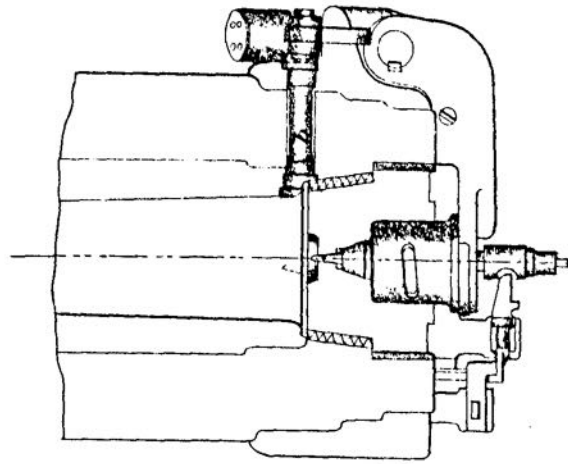
ORDNANCE, QUICK-FIRING, 4.7 INCH, MARK III & III.
BREECH CLOSING MECHANISM.

SCALE $\frac{1}{8}$



b. Extractor
f. Link can lever

— VERTICAL SECTION . —

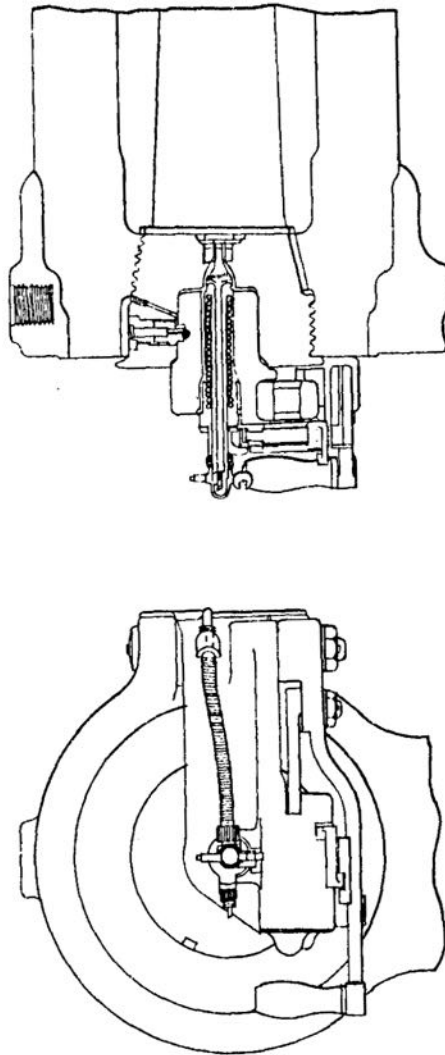


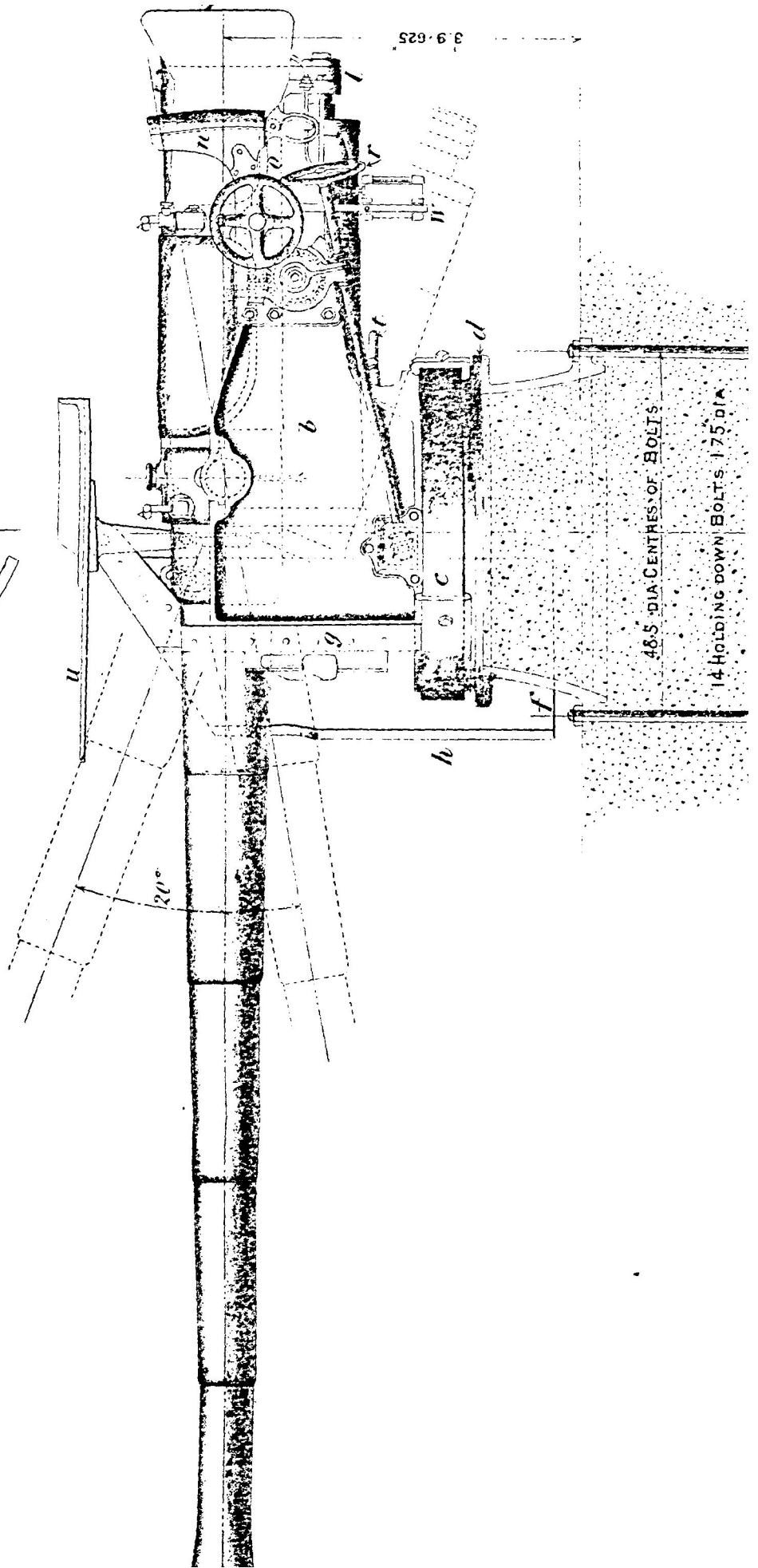
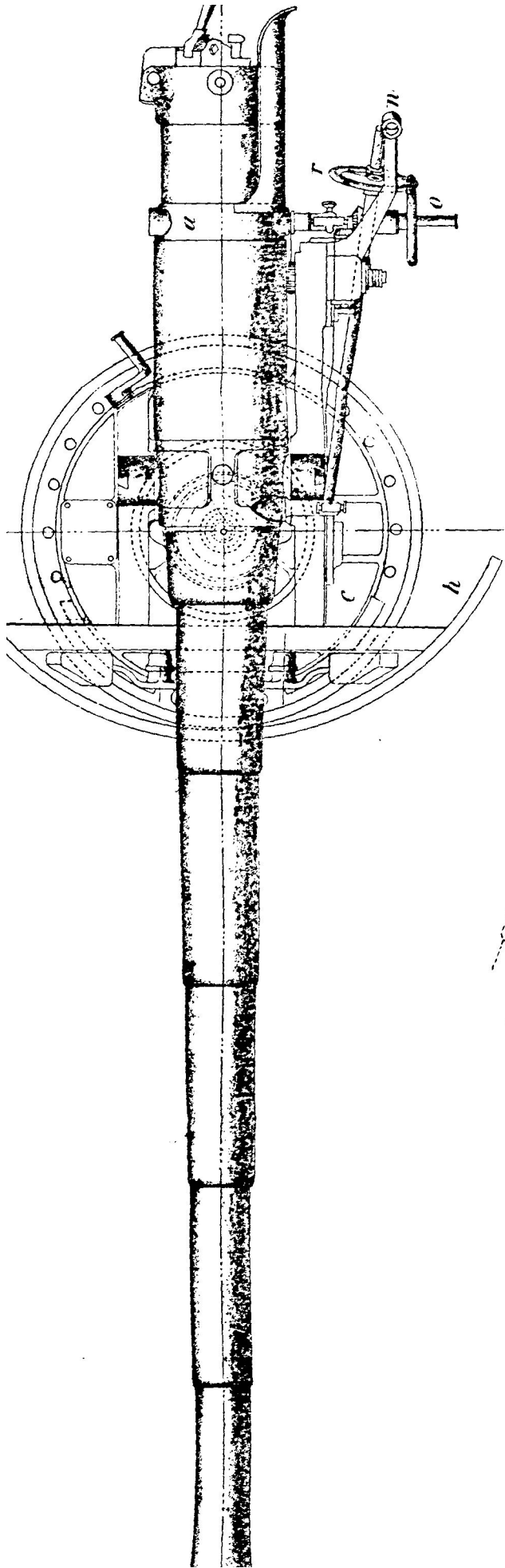
— HORIZONTAL SECTION . —

ORDNANCE Q.F., 4.7 INCH. "B".

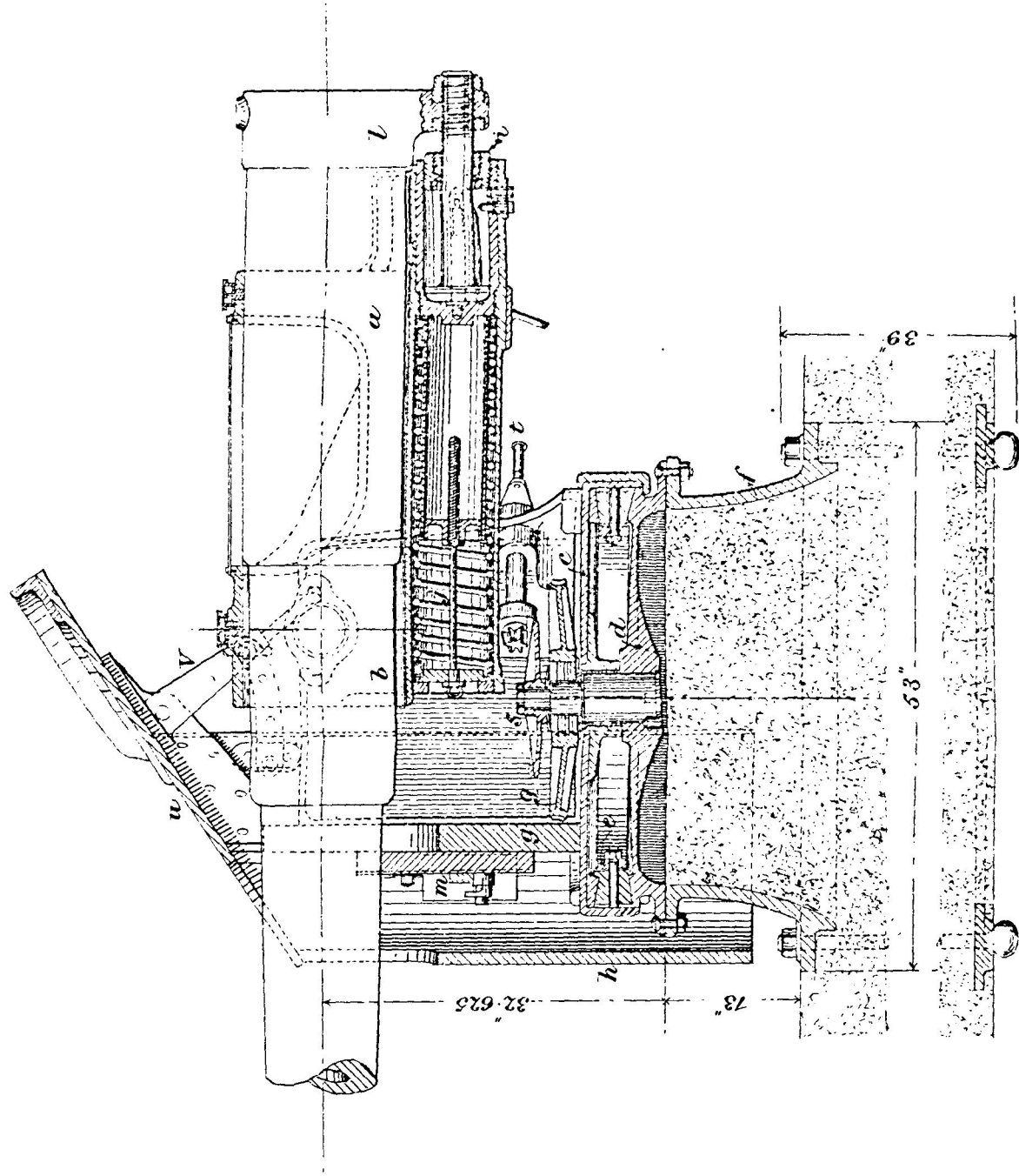
BREECH MECHANISM.

Scale $\frac{1}{8}$

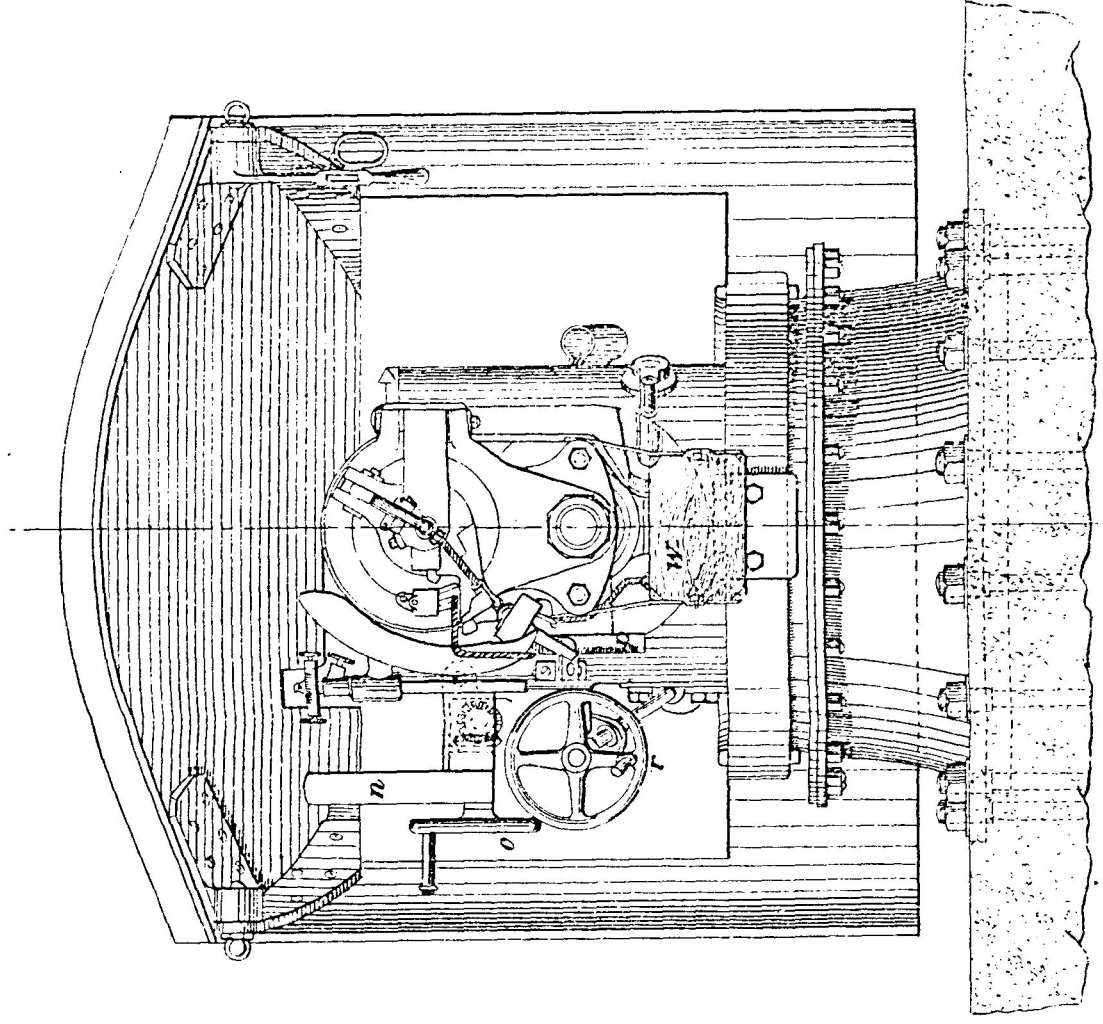




CARRIAGE, GARRISON, Q.F. 4.7 INCH, C.P., MARK I.



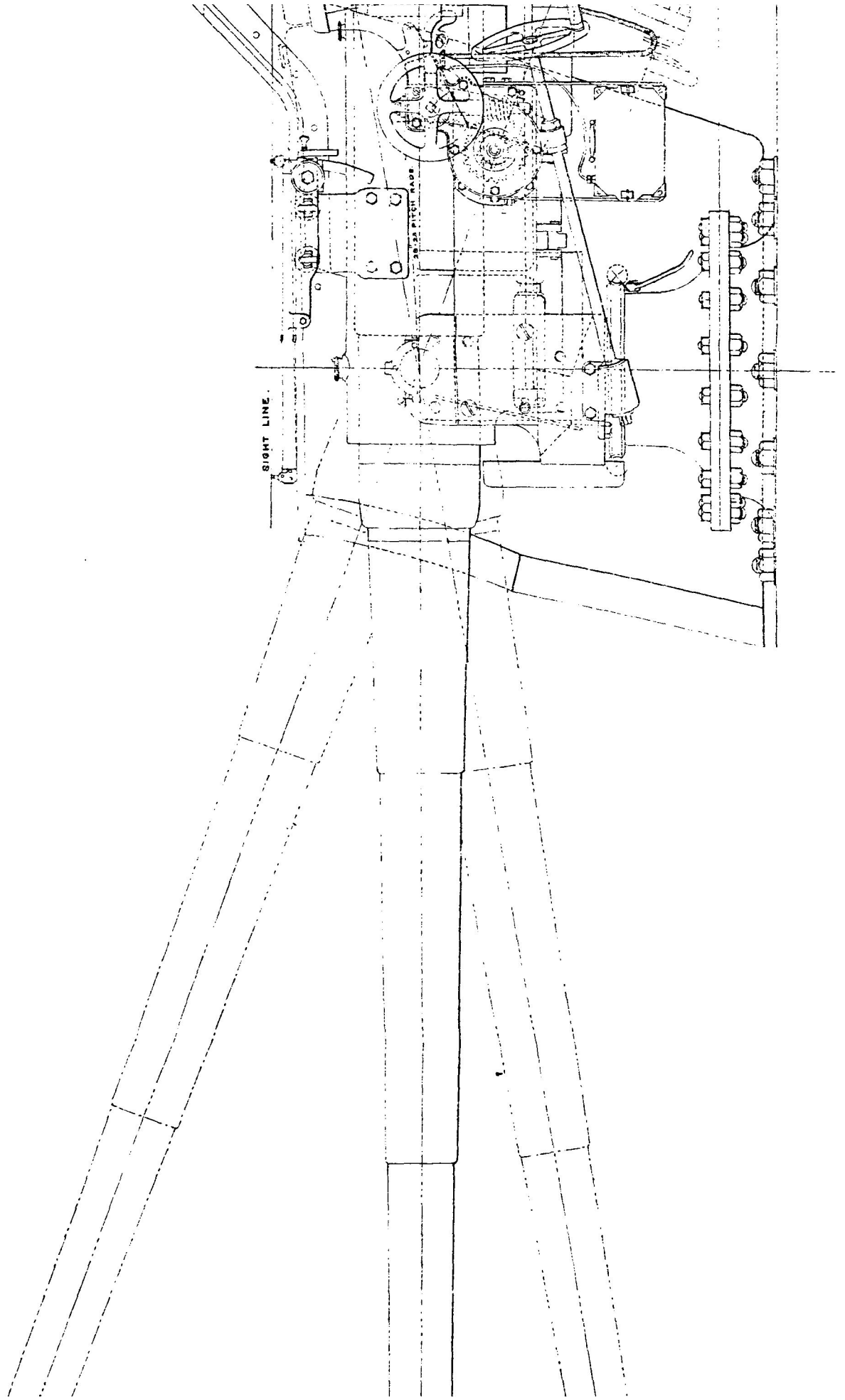
CARRIAGE, GARRISON, Q. F. 4.7-INCH C. P. MARK I.



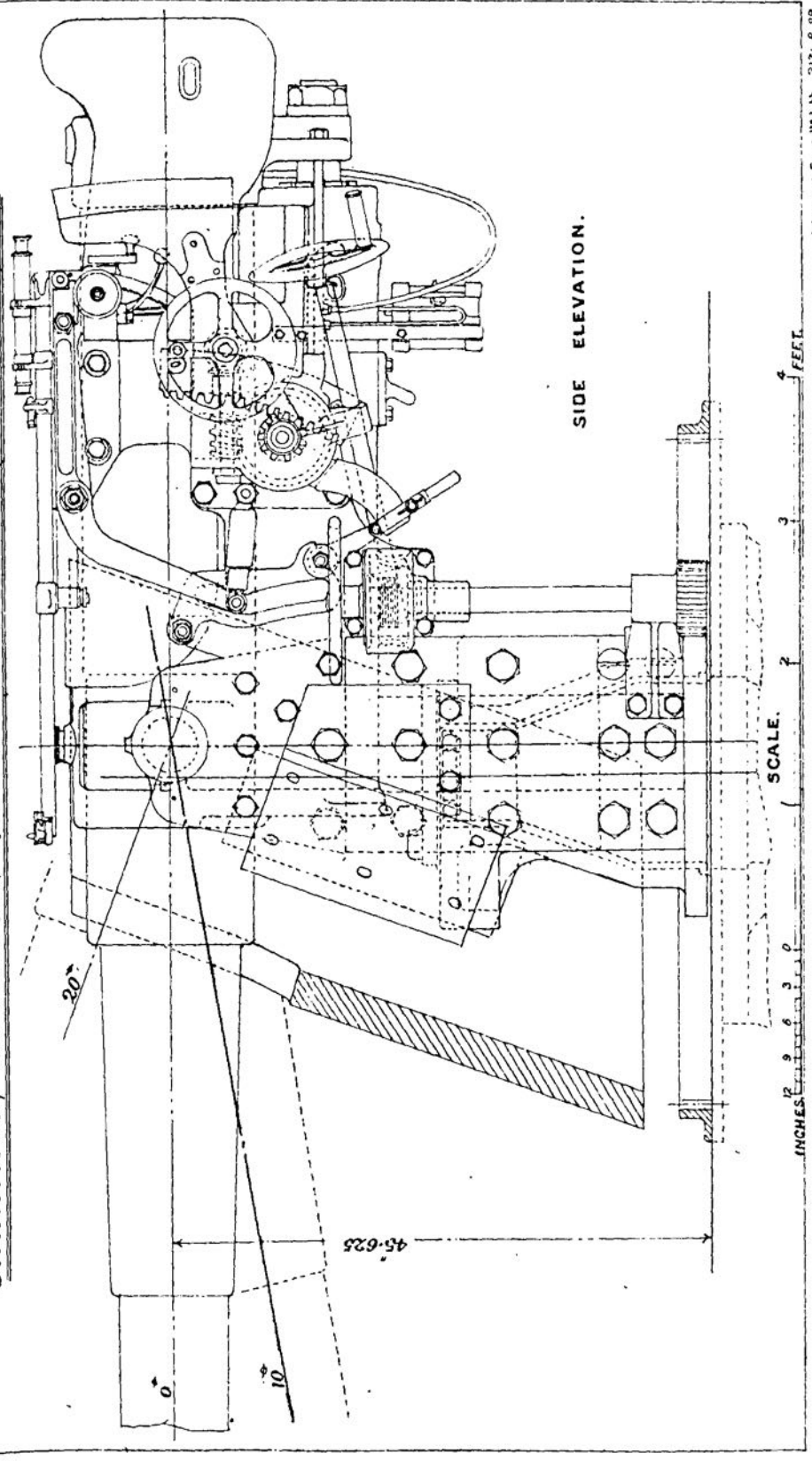
REAR ELEVATION

CARRIAGE, GARRISON, Q.F. 4.7 INCH C.P. MARK II.

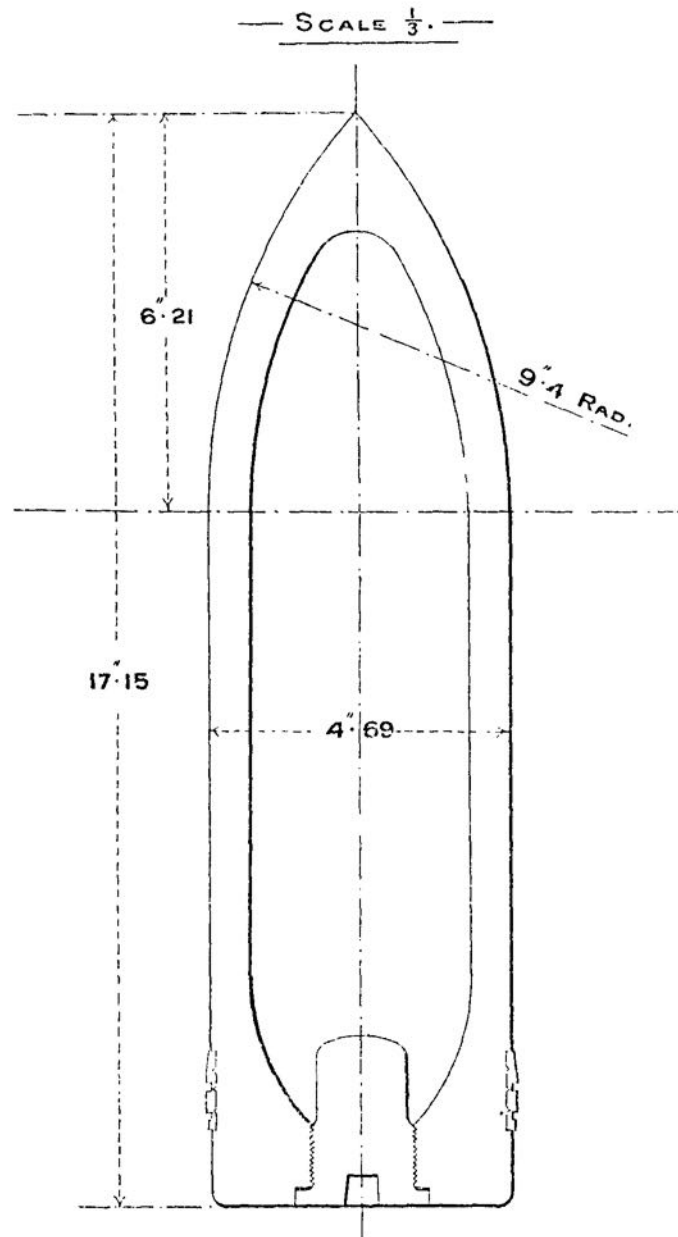
SCALE 1/8".



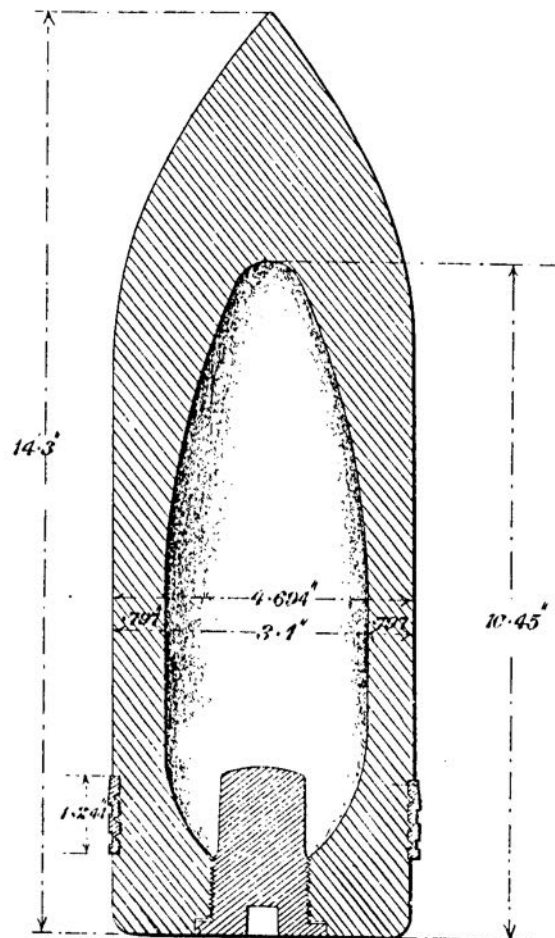
CARRIAGE, GARRISON, Q.F. 4-7 INCH, C.P. (MARK III.) "L."



SHELL Q.F. COMMON 4.7 INCH POINTED C.S. MARK IV.

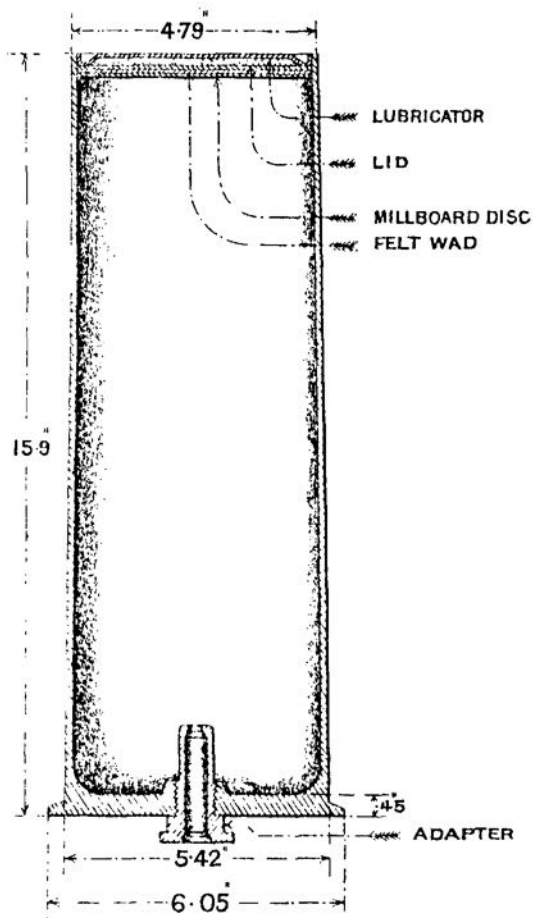


SHELL Q.F. ARMOUR PIERCING 4.7-INCH, MARK IV.



CARTRIDGE Q.F, EMPTY 4.7 INCH.

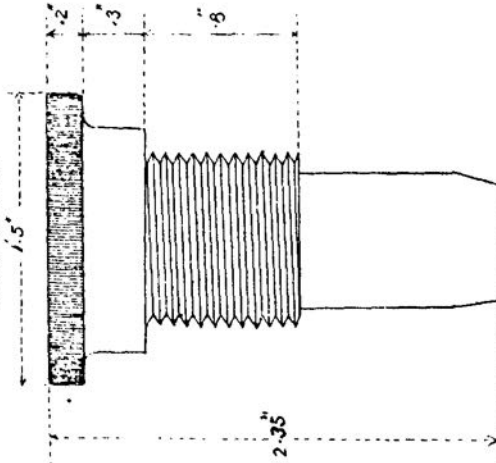
SCALE $\frac{1}{4}$



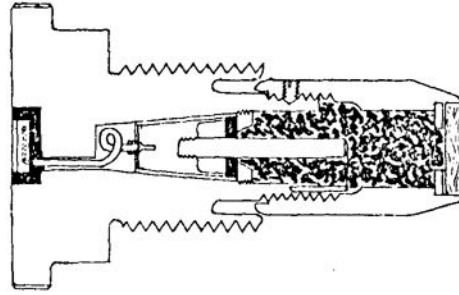
PRIMER, ELECTRIC, LARGE. MARKS III AND IV.

Scale $\frac{1}{4}$.

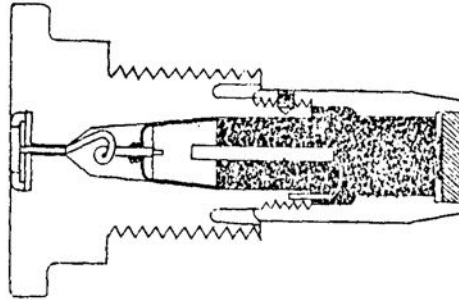
Mark III & IV.
Elevation.



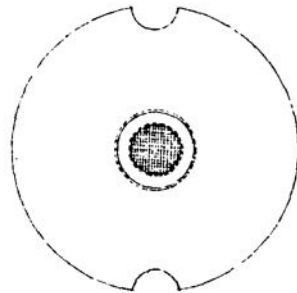
Mark IV
Section.



Mark III
Section.



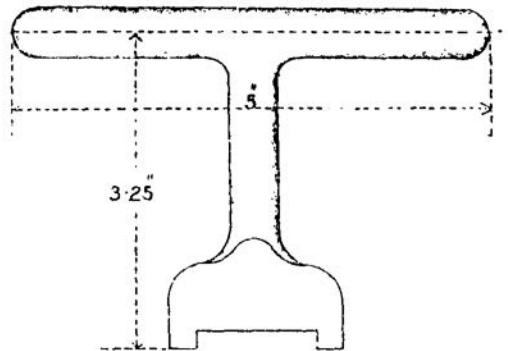
Plan.



KEY, INSERTING, PRIMER, ELECTRIC, Q. F. OR Q. F. C, LARGE. MARK I.

STEEL.

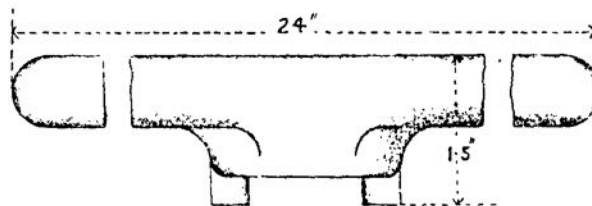
SCALE 1/2.



KEY, REMOVING, PRIMER, ELECTRIC, Q. F. OR Q. F. C, LARGE. MARK I.

STEEL.

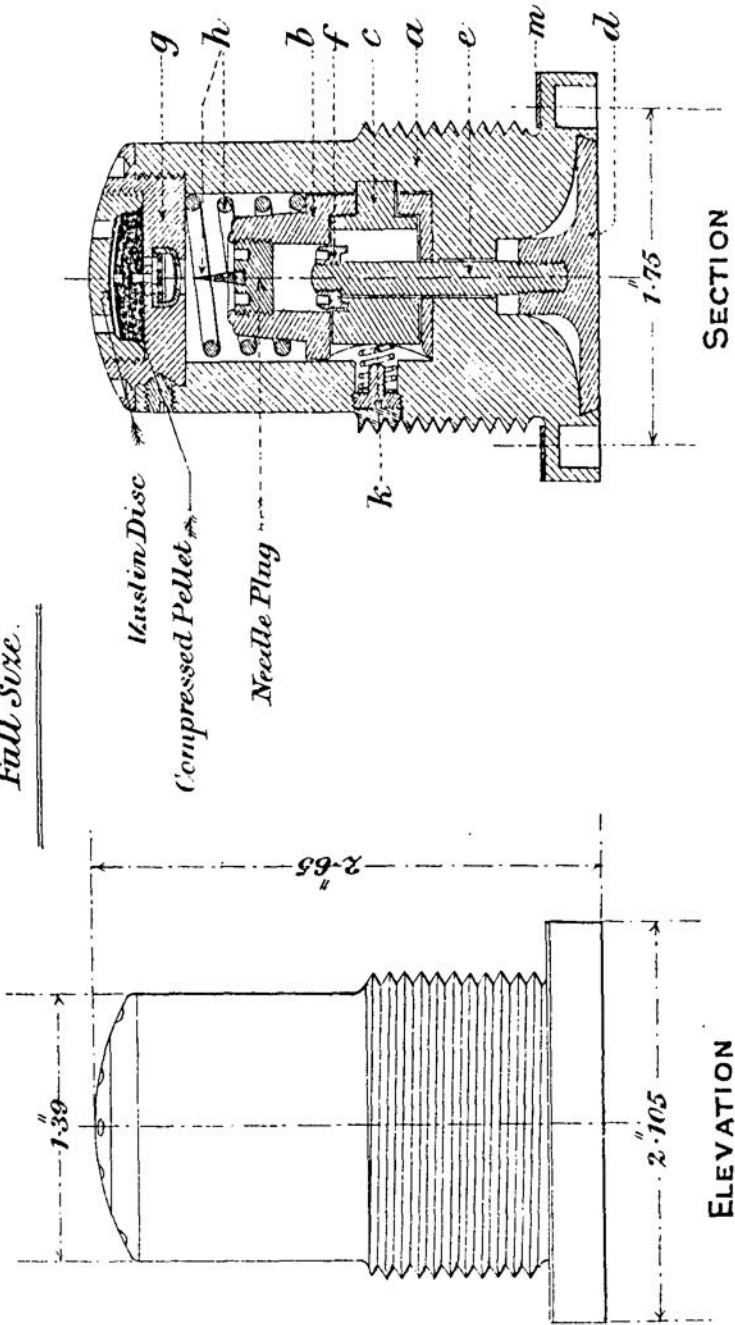
SCALE 1/2.



FUZE, PERCUSSION, BASE, MEDIUM, N° 12, MARK I.

METAL; 1 IN A TIN CYLINDER.

Full Size.



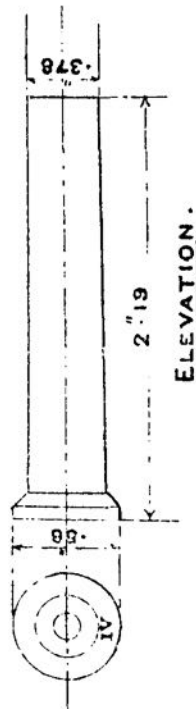
ELEVATION

SECTION

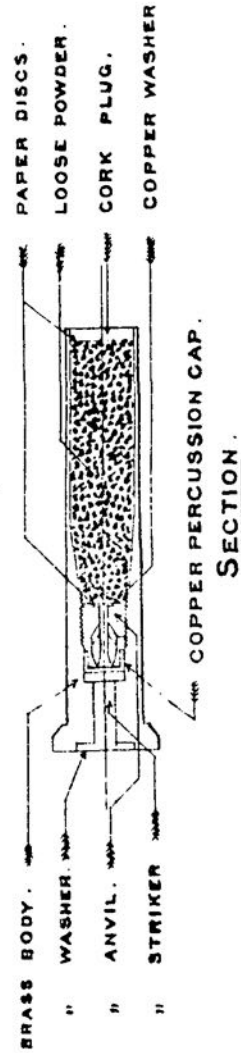
TUBE, VENT-SEALING, PERCUSSION, MARK IV.

BRASS.

FULL SIZE.



ELEVATION.



TUBE, VENT SEALING, PERCUSSION, DRILL, MARK I.

SECTION.

FULL SIZE.

